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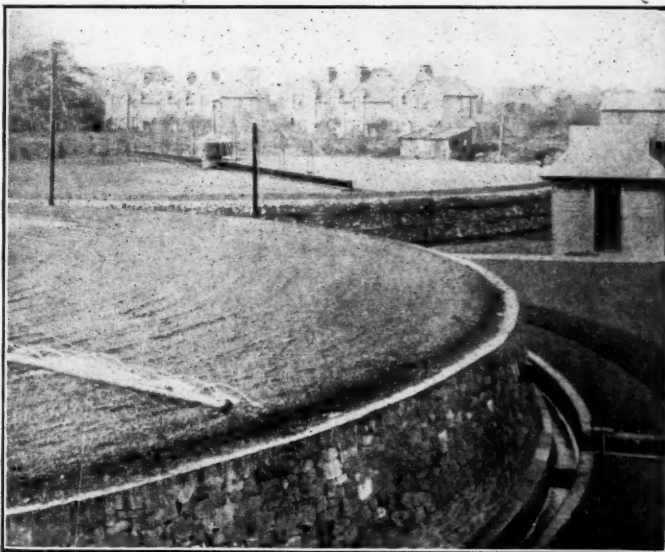
POWER AND LIGHT

Birmingham, England, Generates These From City Wastes—Machinery Actuated at a Distance of Six Miles From the Incinerating Plant

Most American students of foreign sewage disposal works are aware that the largest inland works of this character in the British Isles, measured by the population served, are those of the Birmingham, Tame and Rea Drainage District, providing for the sewage of 800,000 people, of whom more than 500,000 belong to the city of Birmingham. The original Birmingham works, constructed in 1859 as the result of legal proceedings to inhibit the discharge of crude sewage into the River Tame, consisted mainly of two downward filtration tanks, each having a capacity of something over a million gallons. These were supplemented, at a later date, by a plant for chemical precipitation, but renewed complaints to the courts, followed by injunctions, compelled the adoption of land treatment, for which purpose a Joint Drainage Board was created in 1877.

The history of the works has been notable as involving perhaps more in the way of experiment, on practical and continuous lines, than any other sewage works in Great Britain. Prior to the adoption of land treatment, at least seven of the various chemical systems for which sovereign virtues were successively claimed by their inventors or adapters were given a fair trial at these works, and even after the supposed final step had been taken, in abandoning the former reliance upon tanks and chemicals alone, many radical changes have been introduced. The more recent of these date from the appointment of Mr. John D. Watson, M. Inst. C.E., as Engineer, some five or six years ago, that gentleman being prominent in the British sewage problem owing to his advocacy and adoption of percolating filters in preference to contact beds. Two of these, forming part of those installed under his advice and supervision, are shown on illustration herewith; they are 120 feet in diameter, with an effective depth of 7 feet. The relief experienced in the use of the limited area of land for ordinary sewage treatment, due to the growing employment of these filters on the Birmingham works, was an important factor in the decision of the Drainage Board, in 1901, to part with two acres of land to the Health Committee of the city of Birmingham, on which to erect a "destructor," a secondary idea

being to convert into electrical energy the caloric derived from the incineration of house and shop refuse. Another consideration in favor of the scheme, from the Drainage Board's standpoint, was the fact that this energy could be usefully applied on its own works, dispensing with five exceedingly wasteful engines then in operation and getting rid of gas and water bills amounting to nearly \$2,000 per annum. In all, it was estimated that the Board would save at least \$5,000 a year by this substitution, even after making provision for the repayment of principal and interest on the loan incurred.



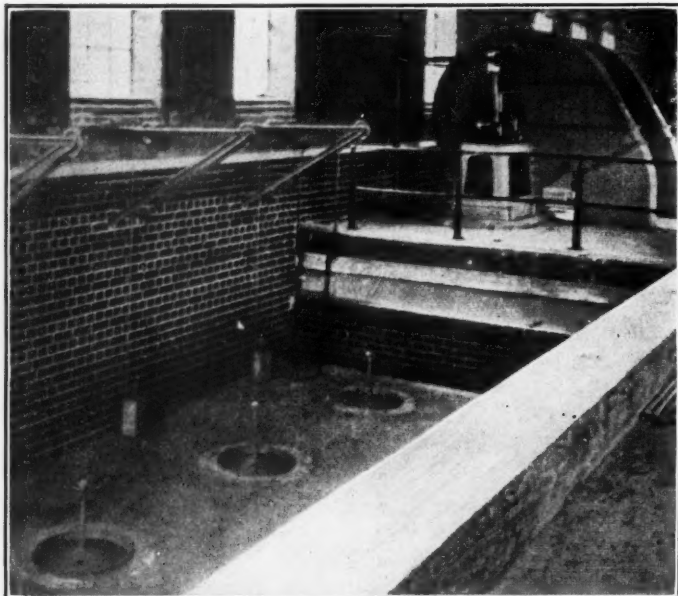
BACTERIA BEDS (PERCOLATING FILTERS) AT MINWORTH GREAVES

The works were formally opened on November 7th last, and we have been favored by Mr. Watson with details which enable us to place before our readers a fairly comprehensive idea of their principal features, among these being the six miles intervening between the "destructor" and the farthest point to which the electrical energy is transmitted.

THE DESTRUCTOR

The Health Committee, with which body the decision on this point naturally rested, adopted what is known as

the Heenan Patent Top Feed type of destructor, the contract for which was awarded to Messrs. Heenan & Froude for \$23,000. One of our illustrations shows the two large refuse hoppers or bins on the "tipping floor," with the circular charging openings communicating with the fur-



REFUSE HOPPERS, SHOWING CHARGING DOORS AND FANS

naces below, one to each furnace. The engines with enclosed fans, between the two hoppers, are used for forcing air into the furnaces, and it is expected that the placing of the fans in this position will greatly assist the circulation and the removal of foul air on this floor, which is approached from the yard level, first by two inclined 32-ft. roadways, from opposite directions, with a total length of 150 feet and gradients of 1 in 18. The inclined road proper, shown in another illustration, at right-angles to the former, is 242 feet long and 20 feet wide, with a gradient of 1 in 19. The fans, 66 inches in diameter, are driven by entirely enclosed self-oiling Belliss engines of 12 B. H. P. each, and are of sufficient capacity to enable sixty tons of ordinary house and shop refuse to be burned in twenty-four hours in one set of four furnaces, which is equal to 56 pounds per square foot of grate per hour. The makers guarantee that when eight furnaces and two boilers are in use under ordinary conditions the plant will evaporate not less than 9,000 pounds of water when the furnaces are fed at the rate of 8,000 pounds of refuse per hour.

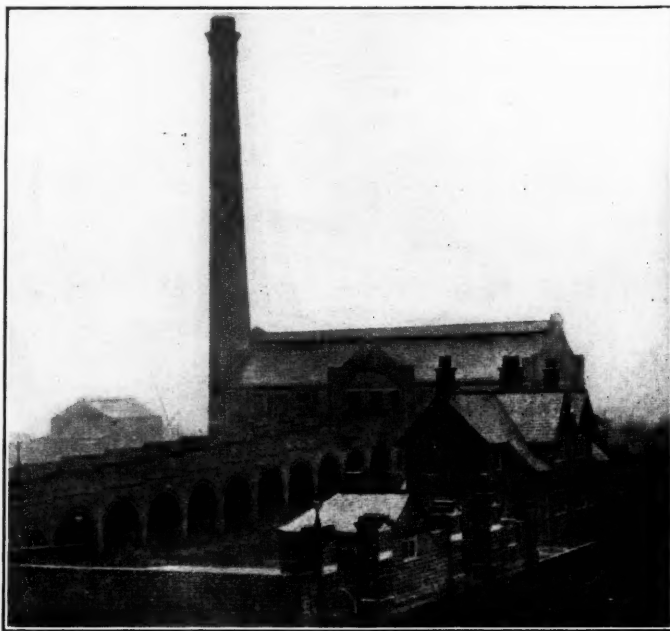
Another illustration shows the clinkering floor and furnaces, the former being 103 feet long and 16 feet wide, faced by the eight furnaces, in two sets. Each set consists of four furnaces, one air-heater and fan, and one settling chamber, connected to one boiler and forming one unit plant. Each furnace has a grate area of 25 square feet. The furnaces and settling chambers internally are entirely lined with 9 in. of firebrick, and externally with 14-in. common hard brickwork; between this outer and inner lining of brickwork there is a 1½-in. cavity filled with silicate of cotton. The whole of the brickwork, it will be noticed, is braced together by means

of double channels placed vertically at intervals; these in turn are secured to horizontal channels let in flush with the brickwork, and fixed so as to take the thrust of the arched covers of the furnaces.

The fronts of the furnaces are of very heavy construction, each weighing something like 5,000 pounds. Each front is fitted with regulating valves to adjust the admission of heated air from the heaters both above and below the grates. The hot air is conveyed from the heaters to the furnaces below floor, in brick ducts running under the entire length of each set of furnaces, immediately under the fire-grates.

Between the two sets of furnaces is to be seen a mass of brickwork, which contains the two air-heating apparatus, each of which provides about 1,500 square feet of heating surface. They consist of a series of 3-in. tubes fixed vertically, and secured at their upper and lower extremities to horizontal plates. The hot gases, after passing through the boiler flues, are made to pass through these tubes on their way to the economizer and chimney, thereby heating the forced air, which is made to circulate around the outer surface of the tubes on its way from the fans to the furnaces. It is claimed by the makers that the introduction of hot forced air into the furnaces gives an initial temperature of from 300 to 350 degrees.

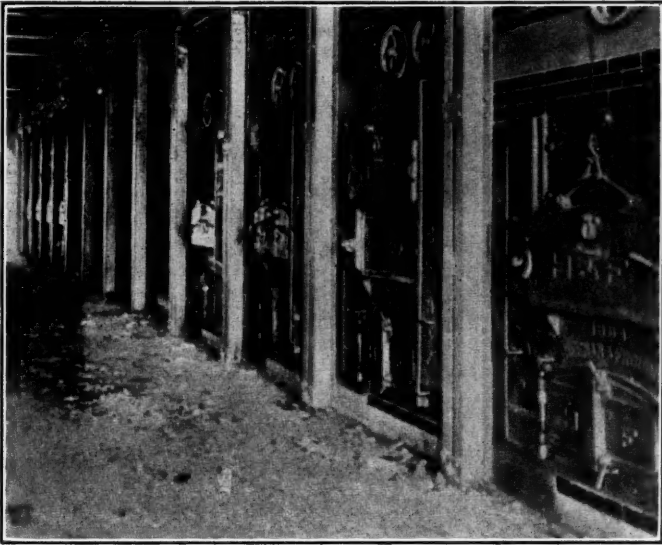
The boiler house, 73 feet 6 inches by 24 feet 6 inches, provides accommodation for three boilers and one economizer, with provision for sixty-four additional tubes. The three Lancashire boilers, each 30 feet long and 8 feet diameter, are constructed for a working pressure of 160 pounds per square inch. Two of them are gas-



GENERAL VIEW OF THE DESTRUCTOR BUILDINGS, SHOWING THE INCLINED ROADWAY

fired, being connected with the furnaces, while the other, intended as a stand-by, is adapted for coal firing. The gas-fired boilers are connected to the settling chambers by means of steel tubes lined internally with fire-bricks. The economiser consists of 128 tubes 9 feet long, 4 9/16 inches diameter, fixed vertically and forced into longi-

tudinal top and bottom boxes in sections forming metal-to-metal joints. The tubes are arranged in two groups of sixty-four each, and connected by cast-iron expansion elbows. Each tube is fitted with triple scrapers, drawn up and down the tubes by means of a small electric motor.



CLINKERING FLOOR AND FURNACES

The stack is 165 feet high from the present ground level; its internal diameter at the top is 7 feet, and it is lined with fire-brick to a height of 130 feet.

ELECTRICAL WORK

The generating plant consists of two British Thomson-Houston 115-k. w. alternating current electric generators, each of which is coupled to a high-speed Belliss and Morcom engine. The electric generators are designed to give their output at 2,250 volts 50 periods, each generator being fitted with a direct-connected exciter, so that the unit is self-contained. Transformers are provided in a chamber under the generating station to reduce the pressure from the primary 2,250 volts to 220 volts, that being the pressure of the lighting circuits.

The overhead line used for the transmission of energy to various points on the sewage disposal works consists of hard-drawn copper of special high tensile strength, supported throughout the entire length by high-tension insulators of the triple-shed type. The section of the copper is so graded that a drop in pressure of only $7\frac{1}{2}$ per cent. over the whole line is obtained at maximum lead. Throughout the length of the line a barbed wire is run on the top of the poles, and earthed at frequent intervals for protection against lightning. For the underground road crossings a special form of steel terminal pole was designed, on the top of which is fitted a dividing box, into which the high-tension overhead wires are led, and there connected to a three-core high-tension cable, led down the inside of the pole and brought out at the bottom into the connection box. The cable from this point is laid in solid bitumen to the steel terminal pole on the opposite side of the crossing, where it is connected through another dividing box to the high-tension line; it then pro-

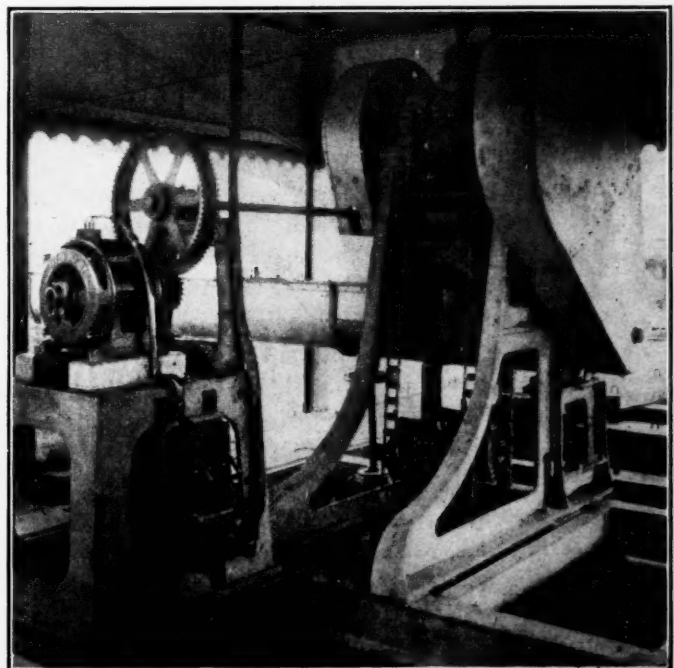
ceeds overhead to the next crossing. The rest of the poles are of creosoted wood, set in concrete.

At Saltley, the line is tapped and led into a sub-station, containing three B. T. H. transformers, each of 5-k. w. capacity. These are used for supplying power to three $2\frac{1}{2}$ -h. p. British Thomson-Houston motors driving sewage screens, and one 8-h. p. ditto for driving farm machinery through a countershaft and for lighting the offices and the house of the Superintendent of Works. The $2\frac{1}{2}$ -h. p. motors for driving the screens are 200-volt 50-cycle machines, running at 1,420 revolutions per minute, and are connected to the screens through spur reduction gearing.

At Troutpool, the power is used to lift low-level sewage in a station containing one 6-in. Gwynne centrifugal pump, designed to raise 835 gallons per minute against a head of 16 feet. It is direct-connected to a British Thomson-Houston 8 B. H. P. 712 revolutions per minute three-phase motor. Other pumping stations, on the same general lines, are at Bromford, Ashold and Tyburn. At Plant's Brook, the largest of these stations has a 10-inch pump, designed to raise 2,280 gallons per minute against a head of 17 feet. At Minworth Greaves, the sub-station is used for supplying power to operate two sewage distributors over circular bacteria beds, which were formerly operated by special engines.

IN GENERAL

The building contract was let for \$86,000; the British Thomson-Houston Company, Ltd., secured the contract for the whole of the electrical work at \$41,000, and the cost of the destructor plant, added to miscellaneous charges, will bring the total outlay up to \$175,000. The entire plant shows a degree of attention to relatively small matters which is regrettably alien to much British work; in particular, the provision of bathing and toilet and mess-room facilities is commendably liberal.



B. T. H. MOTOR, DRIVING SILT ELEVATOR

GARBAGE DISPOSAL*

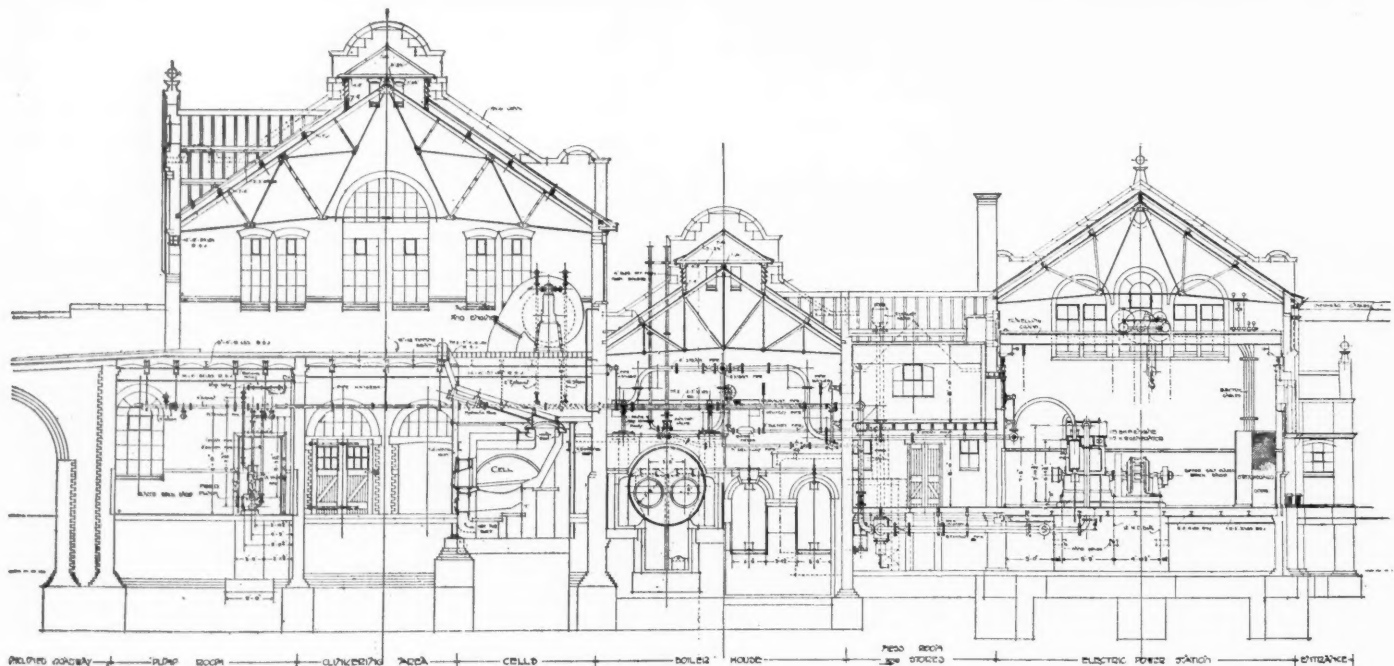
The Problem as Presented in a Typical American City—Incineration Advocated in Preference to Reduction—Considerations of Cost

By Joseph G. Branch

It is admitted by all engineers that England is at least fifty years in advance of this country both in the collection and the disposal of its garbage and refuse. It is further admitted that until recently both the reduction and incineration methods were in an experimental stage in this country. Only after the reduction method had been tried and failed in England was incineration adopted there, and to-day there is not one municipal reduction plant in England so far as I have been able to ascertain, while there are 143 municipal incinerating plants in successful operation, 120 of which supply, without extra cost, their different cities with electric lights, or power for their street railways, water works, or sewerage systems. In

reduction, or utilization, originated, it is not at present used, and I can ascertain no city in Europe which is at present using the reduction method.

It has been repeatedly stated that the success of incineration in England and foreign countries was no criterion for American cities, as the composition of the refuse of this country is entirely different, it being more moist, and not having the same calorific value. This is incorrect. Official analysis shows but little difference where the whole refuse is collected, which includes all ashes, street sweepings and combustible waste, as is done in England and other foreign countries. The refuse of average American cities is of the following composition:



"POWER AND LIGHT"—CROSS SECTION OF DESTRUCTOR HOUSE, BOILER HOUSE AND ENGINE ROOM

addition to these incinerating plants in England alone, the three principal cities of Scotland and the eight large cities of Ireland dispose of their entire refuse by incineration. There is not a large city in Europe, South America, Africa, India or Australia which does not do likewise, and in every one of these different cities and countries the waste heat from the incinerating furnaces is utilized for municipal purposes of some description, usually for electric lighting, pumping, or mortar mills.

Official data collected by me and appended to this report show that the average cost per ton for disposal of the refuse in the English cities named is 26 cents, and in only six of these cities does the cost of disposal exceed 40 cents per ton. In Vienna, where the system of garbage

	By weight, per cent.	By volume, per cent.
Garbage	13	18
Ashes	80	57
Rubbish	7	25
	100	100

Ordinary kitchen garbage consists approximately of,

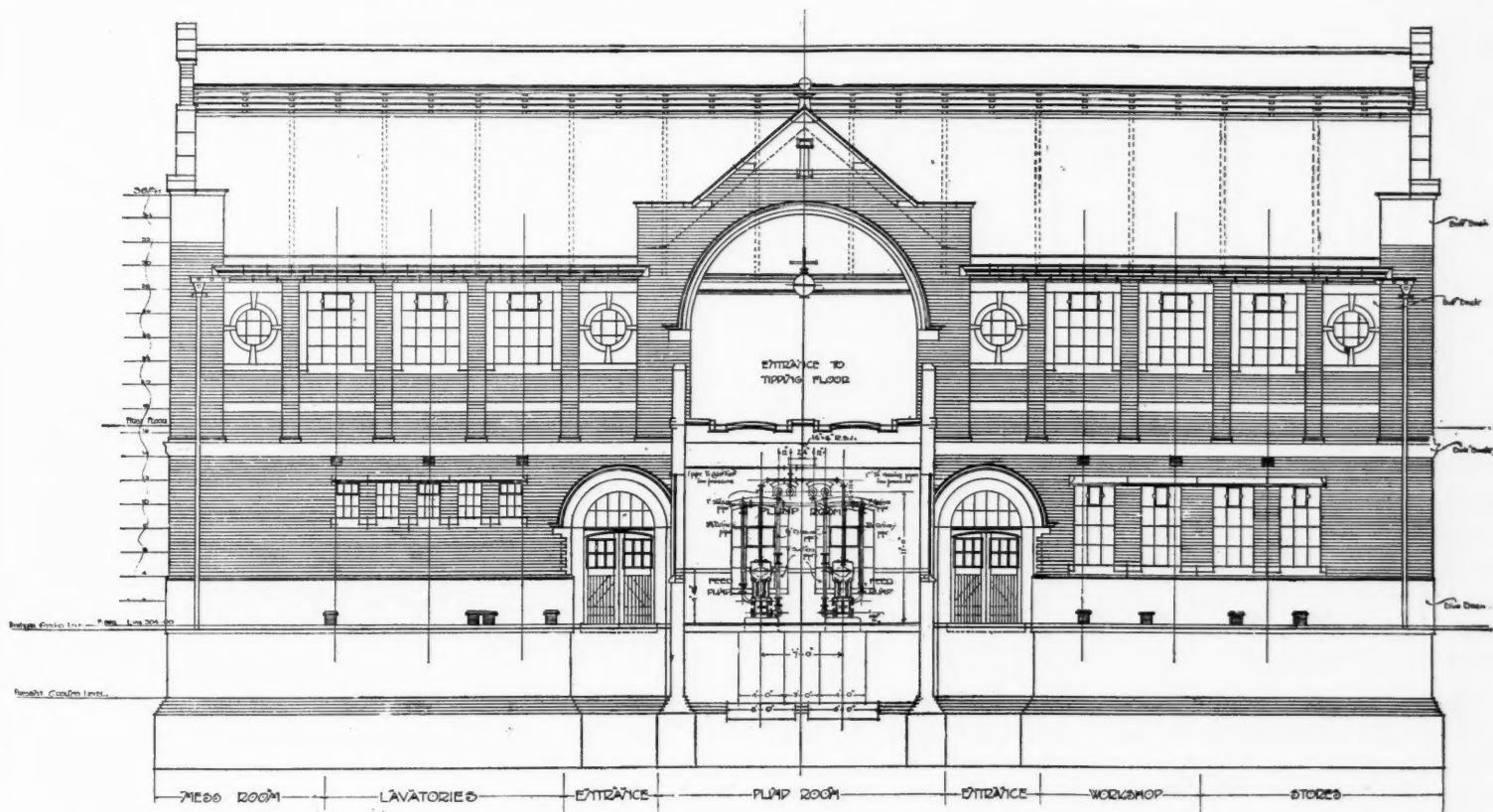
	By weight, per cent.
Animal and vegetable matter.....	20
Rubbish (cans, rags, etc.)	7
Grease	3
Water	70
	100

* From a report by the Author to the Sanitary Committee of the City Council, St. Louis.

To cook the raw garbage and separate it into the four substances, *i. e.*, rubbish, water, grease and fertilizer material, is the object of all reduction systems. The rubbish itself, being tin cans, rags, etc., has scarcely enough value to repay its separation, while the water has no value at all. These two ingredients compose 77 per cent. of all garbage, and the expense of their separation constitutes the chief expense of all reduction plants. The remaining 23 per cent. is of value, and should not be destroyed without some financial return, but it is equally true that the high temperature necessary for the complete incineration of refuse should not be wasted up the stack, but utilized for power purposes. This is apparent from repeated demonstrations that the waste heat from a 150-ton incinerator will develop 1,200 h. p., the equivalent of 895 k. w. of electric current, and smaller incinerators in like proportions. The loss from the failure to utilize this

will render the cost excessive and indeed prohibitive.

It has been clearly shown, where incineration failed in this country, that it was due to improperly constructed furnaces and attempting to burn the wet garbage alone, without the aid of the combustible refuse. This is as great a mistake as to employ the reduction method without requiring a sorting of all refuse by the householder. As only 23 per cent. of the refuse of a city is capable of reduction, it leaves the remaining 77 per cent. to be disposed of by incineration. Whether the city can best dispose of this 23 per cent. by selling the same outright, as it is partially doing, or by reducing it at its own municipal plant, or by incinerating it with the other refuse, is a question for decision. Should the incinerating method be adopted, either in part or for the entire refuse of the city, no incinerator should be accepted in my opinion which does not provide for the utilization of the waste heat



"POWER AND LIGHT"—FRONT ELEVATION OF DESTRUCTOR HOUSE

power would be greater than the loss from attempting to reduce the entire city refuse. The clinker which is left as a residuum forms 30 per cent. of all the garbage and refuse incinerated, and this by-product has a ready sale and is especially valuable for street and paving purposes.

Should this city collect all its refuse, including its ashes and combustible waste, as can be done by ordinance, there is not the slightest doubt that incineration will be a complete success, the same as in all the above-named cities, and at a cost not exceeding 15 cents per ton for its disposal, provided the waste heat is utilized. But to attempt incineration without making use of the ashes, which contain at least 20 per cent. of coal and are consequently of a high calorific value, and the further use of all combustible waste, consisting of street sweepings, boxes, etc.,

under boilers, should it be desired at any time to use same, this opinion being based upon the fact that of the 184 incinerating plants in successful operation there is not one which does not utilize the waste heat in this manner. I know of no method, other than the use of boilers, separate and distinct from the incinerator, which is either practical or will develop more power than is merely necessary for the operation of the incinerator itself. For such power purposes the use of water-jacketed furnaces is impracticable, while the use of an auxiliary furnace, as a stench destroyer, renders the use of boilers for such purposes impossible, and is also antiquated. I know of only three, out of the above number of 184 plants, employing such a stench destroyer, it being entirely unnecessary in a properly built furnace.

THE SEWERAGE OF SPRINGFIELD, OHIO*

The Proposed Works Described and Illustrated—General Principles Capable of Extended Application

By W. H. Steverling

THE topic for discussion to-night is sewerage design and sewage disposal, as applied especially to Springfield's needs. The subject, though not a delectable one, is of great importance to this community. Anything that affects the health of a community affects its growth and wealth. Of what avail is it to construct well-paved streets, to build magnificent office buildings or business blocks or palatial residences, if you do not provide them with all the modern conveniences, the most important of which is proper sanitation? To provide a means of sanitation, the city must build the necessary sewers, with their outlets, and the citizens must consent to be taxed for the same.

Sewage may be defined as the liquid wastes of a community. Sewerage is the means adopted for their removal. Sewage is of two general classes, sanitary flow and storm-water. The sanitary flow is composed of domestic and manufactured wastes, the direct result of the concentration of population; the other is the natural surface drainage, materially affected, however, by the presence of man and his work.

A combined system of sewerage is arranged to receive and carry off both classes in the same conduit. The separate system, on the other hand, provides relatively small sewers for the sanitary flow and large conduits for the storm-water. The factors controlling the volume of sanitary flow are: 1st, the population in the sewered district; 2nd, the per capita use of water, and 3rd, the extent and character of industrial development. On the other hand, storm flow is governed by rainfall, the slope of the ground, the area of the watershed and its capacity for absorption. The size of pipes in a sanitary system can be calculated to a nicety, while the size of pipes or conduits for a combined system can very seldom be accurately determined. The maximum flow in the least possible time must always be provided for, and the conduits are either too large or too small. The natural drainage of the northerly portion of Springfield is directly into Buck Creek; the southerly portion is divided, flowing to Mill Run, Indian Run, Buck Creek, Perrin Ditch and Mad River. Mad River finally receives the total flow of all the others.

Twenty-one years ago, when Springfield was less than one-half its present size, Messrs. Earnshaw and Boeh, of Cincinnati, under instructions from the City Council, prepared a sewerage design, showing a combined system.

* An address delivered by the Author, City Engineer of Springfield, before the Commercial Club of that city, November 2, 1905. Messrs. Snow & Barbour, of Boston and Columbus, are the Consulting Engineers in connection with this project, which has not yet been endorsed by the citizens.

Three years later, in 1887, J. D. Cook, of Toledo, was employed to review and revise the Earnshaw & Boeh design. With only a few minor changes, he reported the project as a perfectly feasible one. Two years later, in 1889, the noted sanitary expert, Col. A. E. Waring, of New York, was employed to look over the city and recommend a design, and reported in favor of a separate system. To construct sewers of sufficient size to carry all storm-water and sanitary sewage to Mad River would be practically an artificial paralleling of the various runs and creeks and a usurping of their natural rights to the surface flow. The present sewers are part of the combined system adopted twenty-one years ago, the interval having taught sanitarians many valuable lessons.

The size of conduits shown in the Earnshaw & Boeh design ran from twelve inches to seven feet two inches. The sizes of pipes for the sanitary system adopted by the City Council and the State Board of Health, the one now to be discussed, run from six to thirty-six inches.

From the topography of Springfield, it requires little study to perceive the great economy and many advantages of the separate system and very little calculation to prove the prohibitive cost of a combined system.

DESCRIPTION OF DESIGN

Based upon the past history of the city and the experiences of other municipalities, the population of Springfield should normally reach 86,000 in 1925 and 160,000 in 1945, and the design of the works is on a basis of seventy-five gallons per capita daily. The intercepting and outfall sewers are of such capacity as to flow two-thirds deep at the end of forty years and the lateral sewers will run half-full at the same period. There are two main intercepting sewers, with two secondary interceptors and an outfall sewer, and a sewer in every street, with a prevailing depth of from eight to nine feet. It is a system of small pipes or conduits, ensuring economy of construction and the highest efficiency in operation. Perfect flushing and ventilating facilities are provided for. Existing sewers are retained and incorporated with the new system, the storm or surface water flow being controlled by automatic regulating devices. The combined length of all sewers in the new sewer system is 121 miles.

SEWER DISTRICTS

There will be twenty-two small sewer districts, instead of six now existing. Each district is intended to form a perfect drainage area in itself, with its main, lateral, and sublateral sewers. Owners will not be called upon to pay a district tax on a sewer which they will never be able to reach and which will be no direct benefit to them.

PUMPING

Topographically, a large portion of Springfield is favorable to a gravity sewer, but there are portions, notably at the foot of Water, Murray, Foster, Front, Sherman and Nelson streets and a part of Lagonda avenue, which are very low, making an entirely gravity sewerage system an impossibility. Two-thirds of the sewage reaches the disposal plant by gravity, one-third must be pumped. There is no other way. This will be accomplished by three centrifugal pumps, the power being furnished by electric motors, automatically controlled by means of floats in the pump wells, no maintenance in the shape of engineers, firemen and other laborers being required. The pumping station, as designed, is an ornamental press-brick building, to be located on the north side of Main street, near Snyder Park entrance. There will be no smell, litter, nuisance, or any other objectionable feature about it and it will constitute an ornament to that portion of Snyder Park.

DISPOSAL

A purification or disposal plant for the treatment of the sewage has been designed. It will consist of twenty-four filter beds, having an average area of one acre each. The type of plant to be used is known as "intermittent sand filtration with preliminary septic treatment of the sewage." There will be no addition to the sewage of expensive chemicals, such as lime, alum, or copperas; there will be no boiling of sewage or burning up of solids, etc. It is simply an act of Nature, due to the action of bacteria on sewage flushed mechanically over beds of filtering material. The proposed plant is designed to remove from 95 to 99 per cent. of the organic impurities, without nuisance under proper management, the resulting discharge being clear, sparkling and free from odor, taste or injurious constituents. There will be nothing to sell, nothing to dispose of. Beware of plants which leave a residue or something that can be sold or must be disposed of, for they rapidly deteriorate into a foul nuisance, infinitely more objectionable than the sewage itself.

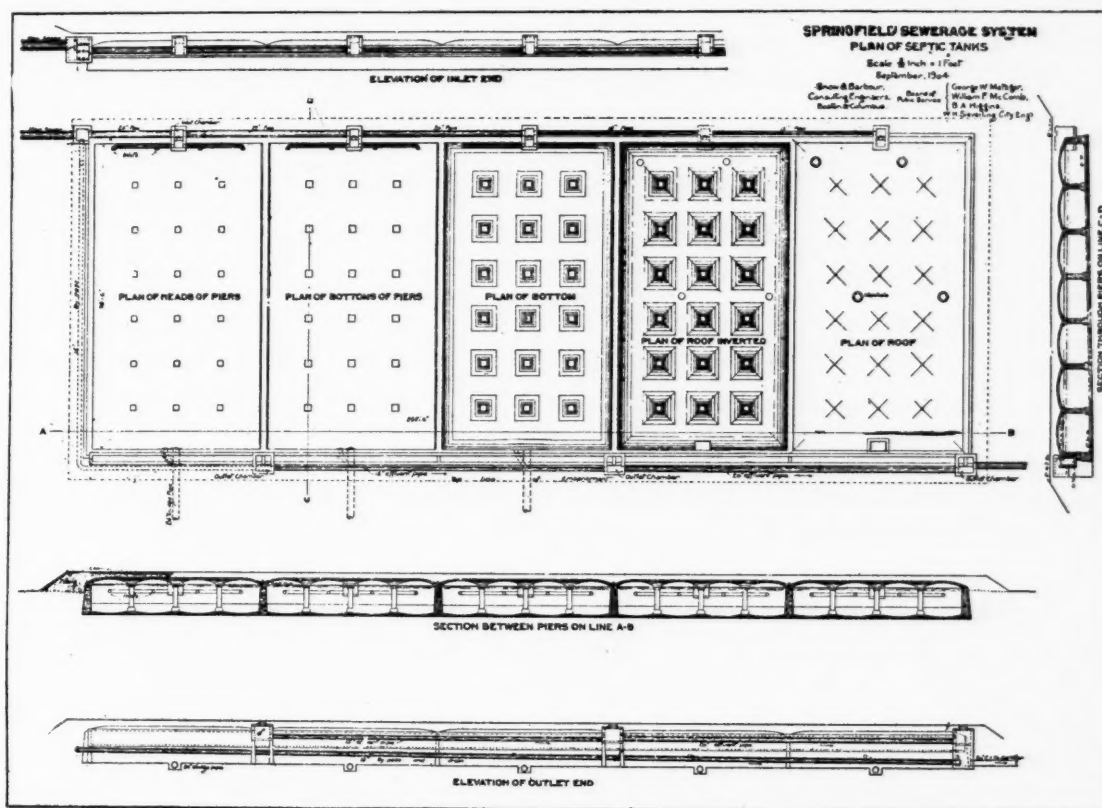
MAINTENANCE

Practically the same force now employed, with an addi-

tional foreman and three or four laborers, will take care of the sewers, disposal plant and pumping station. Automatic devices are used throughout, insuring small cost of maintenance and operation.

COST OF SYSTEM

The estimated cost of the entire system, complete with all of its appurtenances, is \$931,650, but remember that this calls for a sewer in every street (a condition imposed by law in order to make a perfect system) when in fact only from sixty to seventy per cent. of these sewers will be built and many of those only in the next forty to fifty years. It certainly would be folly to construct sewers in the streets both fronting and abutting upon property, unless it were necessary, occasionally, to provide the necessary drainage scheme. Another thing, only about \$225,000 is to be provided by bond issues, to be raised by general taxation; the balance will be assessed on the



SPRINGFIELD, OHIO, SEWERAGE.—THE SEPTIC TANKS

property benefited by the construction of sewers to be built in the future. Property owners now provided with sewerage facilities cannot again be assessed on new sewers, except as to their share of the general tax.

BOND ISSUE

A bond issue of \$225,000 is to be voted upon. This is for the construction of the so-called "low-level interceptor," the outfall sewer, pumping station, and disposal plant, the acquisition of various rights of way, and for the court costs for condemnations. It is necessary to install all of the above before laterals or sewers for house sewage relief in various parts of the city can be built, as each sewer must have its outlet. They are the arteries, as it were, of the system and benefit all alike, consequently the cost is to be borne by general taxation.

LOW LEVEL SEWER

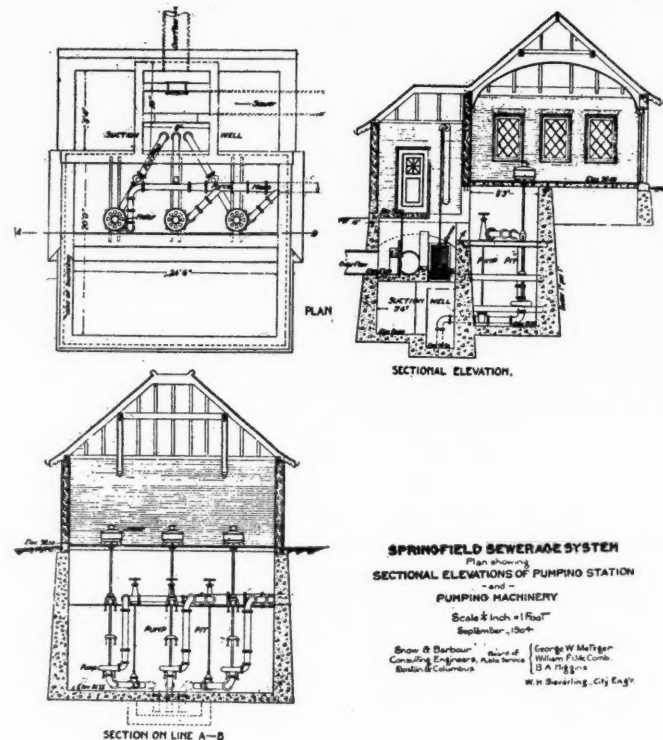
This sewer lies south of Buck Creek from Lagonda avenue to Nelson street, there crossing and running westerly in Front and Warder streets to Fountain avenue; thence by private land following the course of the creek, which is crossed three times to avoid entering the cemetery, and, so far as possible, the Park and also to avoid a goodly portion of very expensive rock excavation. The location in the Park is in the levee north of the creek as far as the west corporation line and southwardly in the driveway leading to main street. Inverted iron syphons are used at the most of the creek crossings. The diameter of the sewer ranges from ten to thirty inches. Its length is 26,770 feet, about 5.1 miles.

OUTFALL SEWER

The outfall sewer begins at Main and Walter streets, where the high-level sewer and the force main from the pumping station unite and send the sewage by gravity to the disposal plant. It flows southwardly along the west right-of-way line of the Peoria Division of the Big Four Railway to the Dayton Pike and thence to the disposal plant. Its size is thirty-six inches, making provision for the flow of the entire city for forty years to come. Rock excavation will be encountered to some extent. The length is 4,900 feet, or 0.95 miles.

DISPOSAL PLANT

This plant is located on both sides of the west corporation line of the city, immediately south of the Dayton road, where the same is crossed by the Peoria Division of the Big Four Railway. It has already been described.



SPRINGFIELD, OHIO, SEWERAGE.—ARRANGEMENT OF ELECTRICAL PUMPING MACHINERY

TAX RATE

The tax valuation of Springfield is about \$20,000,000. The bond issue is to be \$225,000. If these bonds are to be retired in twenty years, with interest at five per cent. (a very high rate) the tax would be \$1.125 per thousand for the first year, decreasing each year until it would be \$0.59 per thousand twenty years hence. This tax would pay off one bond of \$11,250, with interest, each year.

UNDERGROUND WIRING

IN a luminous report on the subject of electric wires in the city, Mr. Frederick L. Ford, City Engineer of Hartford, Conn., discusses the entire question in a manner which imparts a wider interest to his work. Taking up the matter as dating from the passage of a city ordinance, in 1896, requiring overhead wires to be placed underground, Mr. Ford made the startling discovery that while every other corporation has complied with its demands, the Hartford Street Railway Company "has not been compelled to duct a single foot of its miles of overhead feed wires." As he is unable to discover that any action has been taken, by the city authorities, extending the time for the fulfillment of the Company's obligations in this respect, he thinks "it is clearly evident that this matter has been overlooked"—an opinion with which most people will agree.

The following extracts from the report are selected as being of more than merely local application and fairly indicative of the care which has been devoted to its preparation. Discussing the provision of underground conduits from more than one standpoint, he thus refers to the companies' side of the case:

"Public service companies demand a certain minimum

profit on their investments, and if the public places an additional expense upon them the public will pay for it in the form of increased charges, decreased service rendered, cheaper new construction or postponed improvements. It is, therefore, good public policy to consider the companies' side of the case before passing radical legislation, and if the improvements desired by the city can be accomplished in a way acceptable to the companies there is a double gain.

"The economy of underground construction varies greatly with the character and amount of the service. It is actually cheaper to build a conduit carrying 100 pairs of telephone wires in a cable than to place the same number of bare wires on poles; but to lay a duct a mile long for one subscriber would probably cost more than his tolls would ever amount to, to say nothing of the profits. It appears, therefore, that the most equitable plan is to allow certain wires to remain overhead and to duct others."

On the other side, he enters at length into the various considerations which lead to a preponderance of advantages due to municipal ownership.

"The arguments in favor of the municipal ownership

of conduits are that the city secures absolute control of one of the important occupants of its streets. It is enabled to lay the ducts where, when and in a manner which will best serve its interests. It controls the digging up of streets for repairs, and can put in new work in connection with new pavements with a minimum inconvenience to its citizens. Perhaps the greatest argument of all is that if new enterprises are started which require wires, the city has ducts to rent in which they can be laid. If private corporations own the system, it is difficult to force them to rent space to new companies, especially if they are in any sense competitors, and the city is asked to give another permit for duct construction, the streets are dug up all over again, and in the end, the public pays the bill.

"While Hartford has to-day only six, Boston has nineteen separate companies using underground conduits, and St. Louis fifteen. Philadelphia reports that only a sixty-foot street gives room for her underground systems.

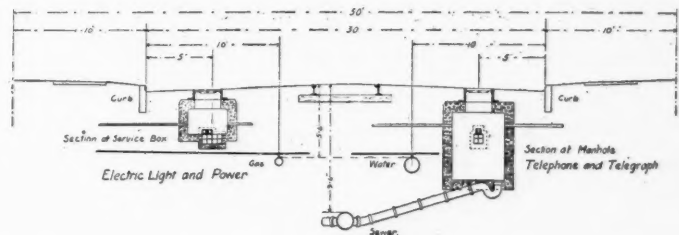
"A common method of paying for municipal conduit construction is to issue bonds. A rental is then charged for each duct used, sufficient to pay for the maintenance of the system and the interest and sinking fund charges on the bonds. On their retirement, the city owns its conduit system, and the companies have paid for it. The city gains a most valuable property and loses nothing but the use of its credit during the life of the bonds. The companies gain the use of a conduit system on the payment of a small annual installment, without tying up a large amount of capital. Or, they may be paid for by annual appropriations, proportioned to the demand for ducts, issuing no bonds. The rentals would be the same, so that the city would get its money back in twenty-five years.

"The arguments against municipal ownership of conduits are the same as are advanced against any movement of this character. The one of greatest weight in Hartford, at this time, is that it calls for money from the city treasury, or for credit, which is much the same, even if the companies do pay the interest. The statement that a certain line of action will result in great profit to the city twenty-five years hence does not interest the citizen who is gathering in cash to pay his next tax bill.

"If the city neither cares to build its own conduits nor wishes to allow the companies to go as they please through the streets, there remains the middle course of ordering conduits built by the companies under municipal inspection. This has probably been done in more American cities than either of the other two plans.

THE MUNICIPAL MANUAL, 1905-6, issued by the city of Erie, Pa., deserves mention among similar publications if only by reason of the comprehensive table giving data of all pavements laid since 1881, with their location, class, price per square yard, date of completion, contractor and guarantee period (if any), and other information in special cases. The general and other ordinances passed during the year ended April 4, 1905, with a mass of other data, go to make up a volume which many larger communities need feel no shame in imitating.

"It is extremely desirable that supervision be exercised which will require the fewest possible repairs. Conduits put in without proper drainage will fill with water; if too shallow they freeze and burst; if not strongly and smoothly constructed they may be broken when drawing in heavy cables; if not on proper foundation they settle and break of themselves. If lateral ducts are not properly laid, it is often impossible to draw the service wires into them. All such defects necessitate opening the streets, and the street surface after being cut can never be put back in quite as good condition as when it was first laid. It is also very desirable that the different companies should combine as far as possible. The two telegraph



TYPICAL LAYOUT OF CONDUITS

companies now rent ducts of the telephone company. Boston has an association of such companies in the same system. The trolley feeders might go in the Electric Light Company's duct with profit to both companies and to the city.

"Conduits should be built large enough to accommodate the companies' ultimate needs. Twenty-five years hence is as far in advance as it is safe to estimate in matters electrical, and all figures following are made on that basis. At least one duct should be reserved for city fire alarm and public wires, preferably in the low tension conduits. The approved methods of conduit construction have changed surprisingly little in the last ten years."

The report discusses in detail the methods of construction appropriate to the situation and includes a draft ordinance for the future control of the problem. The recommendation is made that "the city of Hartford should continue its policy of the past ten years by a gradual extension of its conduit system, for there is no better evidence of the civic progressiveness of a municipality than the removal of its dangerous and unsightly overhead wires." The accompanying illustration is taken from one of the fifteen plates which assist in a realization of the prevailing conditions.

THE NATIONAL ASSOCIATION OF CEMENT USERS will hold its 1907 convention at Minneapolis if efforts now being initiated in that city are crowned with success. At a meeting of the Northwestern Cement Producers' Association held recently it was decided to invite the National Association to convene in the Mill City in January, 1907. A committee consisting of John Wunder, C. A. P. Turner, H. B. Smith and O. U. Miracle will attend the 1906 Convention of the Association, in Milwaukee, to present the Minneapolis invitation.

THE AUTOMOBILE DUST NUISANCE*

Its Cause and Prevention Discussed, with Reference to English and American Palliatives and Experience

BY W. R. Cooper

UNDOUBTEDLY proper treatment of the roads, if something permanent and at the same time not costly could be devised, would be the most effective solution of the problem. If, for example, the surface could remain moist, there would obviously be no dust. But treatment with the ordinary watering-cart is very transient; moreover, it is destructive, for the water, as a rule, is used in excess. The use of a deliquescent substance, such as calcium chloride, naturally suggests itself. But in order to be effective the solution would have to be above a certain strength, and probably a little wet weather would remove so much of the deliquescent material that re-treatment would be necessary very soon.

A number of solutions are now on the market for the more or less temporary treatment of roads. Perhaps the best known is Westrumite, containing chiefly petroleum and ammonia, the product being completely miscible with water. It has been used extensively as a temporary measure. Experiments by the Scottish Automobile Club show that the effect remains for a considerable time. Three stretches of road, each about half a mile in length, comprising metalling in three different stages of wear, were selected. These were thoroughly cleaned and treated with a 10 per cent. solution of Westrumite. This was repeated after three days, and, as very heavy rain fell soon after, a solution of the same strength was applied a third time. The result appears to have been very satisfactory. Absolutely no dust was raised by vehicles of any description passing over the road for a very considerable time after the application, and even after three months the dust was nothing to speak of. On the metalling that had been worn the dust was found to be greater. The permanency of the result probably depends on the amount of traffic, as results elsewhere have not always been so satisfactory.

Other preparations of a similar character have been devised, such as Akonia and Dustroyd. The latter is a liquid manufactured from tar, and as it is not soluble in water it should have the advantage of greater permanence, being less affected by rain than are soluble preparations. It is said to give an asphaltic surface to the roads.

A more permanent style of treatment is by means of oil. So far this method has not received much attention in this country, but in America it is being tried on an extensive scale. This is the case at Los Angeles, Cal. The secretary of the Chamber of Commerce of that city gives the following details in a report on the subject:

* From an article in "Nature" (London, Sept. 14) dealing in its opening paragraph with the recognized grounds of irritation, particularly in English agricultural districts, caused by the increase in automobile traffic.

"For the past four or five years the use of oil on our roadways has been increasing rapidly, and is now considered the best method for laying the dust, as well as of making a serviceable roadway. It has been taken up by the different boards of supervisors in the surrounding counties as well as by the superintendent of streets in Los Angeles, and we have now in the neighborhood 300 or 400 miles of oiled roads within a radius of 60 miles of the city. It has been found, when properly applied and the necessary attention given to it, that it forms a smooth durable surface; and in one case of a road with a 6 per cent. grade treated with oil, it was found after a heavy rainstorm the road had not cut or washed, but on a road in the same neighborhood under the same conditions not treated with oil it became impassable.

"The process of preparation varies considerably according to the opinions and experience of the different workers, as well as with the different materials of which the road bed is composed. Some officials have claimed that a very sandy road would not be benefited with oil, but by repeated experiment it has been found that by putting on a very heavy coat of oil the loose sand has taken it up, and by continual application a very fair road bed has been made out of what was almost impassable sand. In some instances sandy roads have been first crowned up with a heavier soil or with clay, making a firm foundation, and then treated with oil, thus making as good a road as in other sections where the land is heavier. In some localities, where oil has been used for some time and careful attention given to repairs and renewal, the roads have become as smooth and hard as asphalt pavements and without the disadvantage of dust. In preparing an ordinary road, in some instances the surface has been loosened by a machine carrying something in the nature of a rake, for the purpose of being able thereby to mix the oil with the surface dirt. In others where the soil is heavy and packed hard, it has been covered with oil and then a thin coating of light sand is sprinkled over this, which causes the whole to cement together, forming a hard surface. For roads of this nature, that is, with a hard surface, it has been found preferable in many cases to use a light gravity oil, which is absorbed readily by the earth. In cases of light or sandy soil, it is contended by many that the heavier oils carrying more asphalt in their compositions are more desirable and more effectual for the purpose.

"It is a hard matter to give any definite figures as to the cost of treating the roads, for the reason that conditions differ and prices of material vary in the different localities; but from the figures given by some of our supervisors it seems that it takes from 75 to 250 barrels of oil per mile for the first treatment, according to the character of the soil. About one-third of the original amount is sufficient for the second year, and thereafter in constantly decreasing amounts. It is stated that the average cost, taking the first application and the later attention, should not exceed 20l. per year per mile. It is authoritatively claimed that treatment by oil is much less expensive, even at the outset, than the use of water in laying the dust, and at the same time is enduring."

Mr. Lyle Rathbone, in a paper read before the Liverpool Self-Propelled Traffic Association this year, gives an account of experiments with oil carried out on the roads at Liverpool. The oils used were hot and cold

creosote oil by itself, creosote oil mixed with small proportions of pitch, resin or tallow respectively, hot coal tar, cheap waste oil from coal tar, common petroleum, and crude Texas petroleum. The general results do not appear to be anything like so permanent as those obtained in America, referred to above. They were satisfactory as far as they went, the tendency being for the road surfaces to be preserved, to dry more quickly, and to be cleaner. No very conclusive result as to the best oil seems to have been reached. Creosote oil with resin gave the cleanest and best appearance, and ordinary petroleum was the least lasting. Heavy coal tar waste oil lasted longer than creosote, and was very much cheaper; a single coat kept the surface in good order for about three weeks, and two coats for about five weeks.

Experiments by the Scottish Automobile Club showed that crude oil was most effective. It was poured on to the cleaned road surface by means of cans, and brushed over so as to saturate the surface uniformly. In about twelve hours the surface was dry enough for traffic. The cost per mile of road of fair average width was about £20, which may seem costly, but the method has the great advantage that a single application is sufficient for a season, and against this cost must be set a saving in other ways. It is to be hoped that more extensive experiments will be carried out on these lines, for the results seem rather contradictory, and there are probably a good many factors to be observed. . . . After referring to the use of tar, particularly in the English road surfacing material known as "Tarmac," the article proceeds to discuss the possibilities of improved car design, both as regards those already in use and such as are yet to be produced, as follows:

Speaking generally, and leaving such special points as direction of exhaust out of account, it may be said that the dust is raised by the tires, and is then scattered by the air currents produced by the body. In other words, if the body were moved along the road at its normal height, supported by other means than the wheels, very little dust would result. But it is equally true that if the wheels could be run without the body there would not be much cause for complaint as to dust. By *body* is here meant the whole structure, apart from the wheels, so that the term is more comprehensive than usual. The passage of a car body through the air necessarily creates a great deal of disturbance, and the extent to which the air near the ground is disturbed must depend to a great extent upon

the shape of the body. The less the disturbance, the less will the dust be formed into a cloud. . . . In a paper read in 1903 before the Automobile Club, Colonel Crompton and Mr. Crawley came to the following conclusions, based on these experiments: Hard tires are better than soft; narrow tires are better than broad; neither have a preponderating influence; flaring mud-guards are probably bad, especially if they come low down; cars which are low underneath are worse than cars a long way off the ground; but smoothness of bottom-shape and absence of forward coning are infinitely more important. There is strong evidence that it is desirable that the car should slope upwards towards the back. At the same time, the authors point out that "a low car is not necessarily a dusty one, nor is a high car necessarily dustless." . . .

In approaching the problem it is necessary to give up all preconceived ideas, for the practical results by no means always agree with what would theoretically be expected. If a dusty car and a comparatively dustless car are examined and compared, it is often not at all easy to say why the one is more dusty than the other. People are apt to have the idea that comparatively small differences in the car body are important. Last year, however, the Automobile Club carried out a series of experiments on different shapes of body, and these showed that the dust raised did not depend to any great extent upon the shape, at least as regards small modifications of the upper structure. An irregular shape under the chassis is no doubt bad, but the transverse tool-box carried low down at the back of the car, which is frequently seen, is certainly harmful. . . . Although, from the point of view of raising dust, the tires may not be so important as the body, their action does seem to be important enough to warrant more careful investigations. They are capable, in themselves, of raising a good deal of dust, as is often to be seen in the case of bicycles. Very possibly dust is carried up by tires through a kind of suction, and this may vary a good deal with the design. Now that there are so many different tires, including non-skidding bands, on the market, there is likely to be a considerable difference in the various types as regards dust. . . . In the case of wheels which are drivers, there will be a certain amount of slip of one kind or another, and the dust raised is likely to be greater; but, actually, there does not seem to be any very great difference between drivers and non-drivers—at least there is much less than would be expected.

THE METER SYSTEM IN MINNEAPOLIS

UNDER a recent ordinance of the City Council steps are being taken to make the meter system universal in Minneapolis, this applying to old as well as to new buildings. Out of a total of nearly 29,000 taps in the waterworks system about 13,000 are now supplied with disc meters. The revenue from metered services, in 1904, was \$154,694, as compared with \$92,316 from the flat-rate service,

and it is expected that the aggregate revenue for 1905 will show an increase of at least \$15,000 over these figures.

The gradual installation of meters since their introduction in 1887 has resulted in a large reduction in the pumpage. The present rate for metered service is eight cents per thousand gallons. It is hoped that the city will be entirely under the meter system within three years.

PUBLIC UTILITIES AND MUNICIPALITIES

PROF. E. H. S. BAILEY, University of Kansas, delivered an address on this subject at the annual meeting of the Kansas Gas, Water and Electric Association, held at Kansas City, Mo., October 13 and 14. Disclaiming any intention of recapitulating the many arguments for and against the public ownership of public utilities, he desired to refer to the supply, to the public, of things without which it could not get along, and continued as follows:

"According to a recent report there were in the United States 3,326 water-works, of which 53.7 per cent. are owned by the city, 965 gas plants, of which 1.5 per cent. are owned by the city and 3,032 electric light plants, of which 15.2 per cent. are owned by the city.

"As the electric light plants were more recently installed than the gas works, the tendency to municipal ownership is plainly seen in the greater per cent. of the electric light plants owned by municipalities. The large cities at that time in which the water-works were owned by private corporations were: San Francisco, Indianapolis, New Haven, St. Joseph, Patterson, Omaha and Scranton.

"There are only a few cases in which sewage plants or sewage purification works are owned by private corporations, and it is of necessity the case, on account of the material which they handle, and the importance of the Board of Health having control over the plant as a whole, for sanitary reasons.

"It is evident that the tendency to advocate public ownership of the public utilities is due partly at least to the fact that private corporations have not in the past done their best to supply these necessities at a fair rate of compensation and of good quality, or at least to the belief of the people that this was the case, which amounts to the same thing.

"A recent editorial in the Kansas City Times upon the railway situation is in the same line and is as follows:

"It is a remarkable thing that the railway world, which contains some of the ablest men in the country, should still be so indifferent to the growth of sentiment favorable to safe and effective regulation, to the elimination of railway influences from politics and to the establishment of the square deal generally between the shipping agencies and the shipper. The systematic opposition of the railways to the proposed rate regulation, to the building of the Panama canal, to measures designed to abolish the legislative lobby and to all other reasonable efforts to establish an open, frank, business-like system, free from corruption and favoritism—these are manifestations of singular shortsightedness. Those who deplore government ownership, or the agitation of it, should be foremost in encouraging all reasonable steps to avoid it. The present policy of the railroads is directly in line with the promotion of extremely radical agitation. The people, once they are roused, must be met with fairness or they will go to extremes. That is not a matter of con-

jecture. It is a matter of human nature, demonstrated by abundant precedent.'

"From the standpoint of the layman then it seems practical to give the very best possible service for the money. To particularize: see that the gas is of good quality, up to the required candle-power, free from impurities, delivered under the best pressure, and that uniformly, and in fact as good gas as can be provided for the money, and then push the use of it.

"Is it not worth while for the superintendent to be something of a scientific man in his way, and for him to go out of his way to prove to customers the value of the gas for heating and lighting, to show that the best approved scientific methods have been used to make it pure and suitable for use as a lighting or heating agent? Let him show, if he deals in natural gas, that it is even better as a heating agent than the artificial gas—that the natural gas cannot be burned in the ordinary fish-tail burner, and why this is so. A little information of this kind will prevent a lot of kicks from ignorant people, and will make the public friendly rather than inclined to find fault with everything. How can this information be given? Gas men will find a way.

"The same general attitude to the public will apply in the water supply business. Will it not pay to have the water as pure as possible? Chicago, be it remembered, gives the people a daily bulletin on the quality of the water used. In times of epidemic, although the water company may have faith in the purity of its supply, it does not discredit them if they suggest that 'boiled water is sure to be safe.' Use the best appliances to secure pure water, by filtration or otherwise. Do not use 'any old filter,' and then insist that the water is pure. Let the water supply be abundant and furnished at uniform pressure. Take the people into your confidence. It is probable that more than one-half of the people in Lawrence and Topeka believe that the city supply is straight river water.

"Less can be said in this line in regard to electric light service, but even here there is a chance to make it the best, to keep a steady current, to educate the people to use electricity for power, and in some special cases for heating.

"In the case of street railways, there are so many things that go to make what is called 'good service' that they cannot here be enumerated. The fact is that the supply of gas, water, electric lights to the people, must be upon a different basis from the supply of potatoes, furniture or neckties. In the latter field if the goods are inferior we take them back or get a rebate, or patronize some other house in the future, but when we do not find the gas, or water, or electricity satisfactory, we are told that 'we can go without'—when they know that usually we cannot go without."

A VETO MESSAGE

IN vetoing a franchise granted by the City Council of Little Falls, N. Y., to the Hudson River Electric Power Company, this being in addition to the rights exercised by two existing companies, Mayor Edgar H. Douglas recites the facts and lays down his objections with such clearness as to convert what is ordinarily a document of purely local interest into a statement full of significance and suggestion for other cities. We propose, on that account, to place the leading features of his veto message, dated November 24, 1905, before the readers of THE MUNICIPAL JOURNAL AND ENGINEER.

The franchise passed by the Common Council on November 9 granted permission to the Company to build, maintain and construct a system of poles, subways, etc., in, through and over the streets and public places of the city, for the purpose of furnishing light and power therein. In reviewing the entire question, Mayor Douglas records, as being undisputed, certain facts which he divides into two heads. In the first place, a large monetary investment is necessary for the purpose involved, and in any city of less than 50,000 population "the field of operation is not large enough to allow of two competing producers." So far as he is aware, "actual competition in public lighting does not now, and has never, existed for as long a period as five years." In the second place, the ultimate cost of light and power to the consumers will depend upon the amount invested by the producer, the income from which must be paid by the former and forms, in fact, a constant tax upon them. This being so, it is to the consumers' interest that the amount invested be kept as low as possible, while "any action taken by the city which directly increases the producer's investment is an unwise and thoughtless action."

On this basis, Mayor Douglas regards the proposed franchise to a competing company as "a useless and extravagant increase of the amount of capital invested in a public utility," and is fortified in that position by the action of the State Legislature, in its last session, in establishing a Commission empowered to fix the price to be charged by producers of gas and electricity. He is of the opinion that, after going fully into the facts and figures of a given case, this judicial body would be guided, in fixing a price, by the equity of securing a fair return upon the amount invested. "This being so," he proceeds, "it is more than ever to the interests of this or any other city to keep the amount actually invested by any given producer of light to the lowest possible limit. And each additional \$100,000 of capital means a handicap upon the city, should it apply to this Commission to have the price to be paid to the producer fixed either for public or private lighting, and, in this connection, it is well to remember that the price to be paid for private lighting is of much greater relative importance to the people than the price paid per street lamp.

"If then, the people of Little Falls should grant three separate franchises to as many different companies, and

each should come into the city and construct an independent system at a cost of \$100,000 each, any one of which would be adequate for the entire city, and each prepared to compete and actually did compete for a short time, and then united in one corporation, or were absorbed by one of the three, as inevitably happens, we would then have a corporation with \$300,000 capital and investment, upon which dividends or interest must be earned and paid by the people of this city; and in the event that we thought it fit to appeal to the State Commission, the \$300,000 investment should be the one considered by that body in fixing the rate to be charged, although, as a matter of fact, \$200,000 of that investment had been directly caused and brought about by the people themselves in granting unnecessary franchises and allowing the streets to be blocked with duplicate systems.

"My view, therefore, is that to increase franchises merely means the increase of the investment of the one company which ultimately controls, which increased investment means an increase of the cost of production, which increase must be paid by the people themselves in the end. And no matter how reckless the cutting of price for a year or two, any loss thus incurred by the company, together with the income on the increased investment, must in the end be paid by the people of this city. Therefore, I refuse to consent to an increased investment for producing light in this city to the extent of \$50,000 or \$100,000, considering it equivalent to bonding the city to that extent for an unnecessary expenditure.

"I am aware that there are provisions in franchises and in the statutes forbidding combinations to keep up prices and forbidding sale of the stock of one company to another, but such provisions have been in the statutes for a long time and they have never yet prevented a single man or group of men from actually controlling and actually owning, combining, absorbing and uniting competitors in public utilities under one head.

"If any new franchise is to be granted I believe such franchise should be prepared by the City Attorney, with the approval of the Common Council, with such provisions and safeguards as shall be necessary and advisable to protect the interest of the people of the city, both as to public and private lighting."

Further on, attention is directed to the fact that there are already enough poles and wires on the principal streets, and the Mayor believes that "within the next twenty-five years the city of Little Falls will have a general subway which will accommodate the requirements of all companies using wires in the city. And if the Hudson River Electric Power Company is to be allowed to construct a subway, it should be large enough to carry the wires of all the other companies; and such subway should, say at the end of twenty-five years, revert to and become the property of the city of Little Falls, so that at that time the city may collect

a revenue from this company in consideration of the grant."

After dealing with some of the local considerations, including the financial responsibility of the parties seeking the franchise, Mayor Douglas thus refers to certain safeguards essential to the grant. "If this franchise is to be granted, there should be an express stipulation that it was not at any time to be assigned. Too many grants of public rights have been made to corporations that obtained them for purely speculative purposes. The rights of the people should be safeguarded absolutely. We have no moral right to give away the valuable rights to the use of our streets for so long a term as is now

contemplated.

"I believe that the city should do its own lighting, not to own the generating plant, but to own the distributing system and buy the power. This is a very satisfactory method of municipal lighting and is worthy of consideration. . . . If substantial and permanent advantages can be secured to the people of this city, I am as eager as anyone to aid in obtaining them, but I apprehend that the granting of this franchise at this time would not secure such advantages, but would rather be a hindrance to such new developments as may be made during the next few years."

The Mayor's veto was sustained.

SEWAGE DISPOSAL PLANTS IN KANSAS *

In any State where a majority of the water supplies are obtained from rivers and streams, it is essential that these supplies should be safeguarded and properly protected, for in the purity of the water supply often lies the health of the entire community.

Many cities and towns have for years been installing filtration plants for the filtering of their water supplies, spending large sums of money and employing the best engineering talent to design effective filtration plants to remove impurities from the water supplies. Many of these same cities are thoughtlessly causing these supplies to become more impure each year, by discharging the city sewage into the same streams where drinking water is taken out. No doubt if as much money, or less, were spent in preventing the pollution of these streams, there would be much less need of the expenditure of such large sums in filtration plants. For years past, it has been the policy of cities, large and small, to discharge their sewage, without treatment, either into running streams, or, as in large cities, into bays and tide-water channels. This practice has rendered many harbors that were once like pleasure resorts—the beaches used for bathing and the water for pleasure boating—into offensive water-ways that are a disgrace to any city. In some cities the discharge of the sewage has been so foul as to cause contamination to such an extent as to make the shores almost uninhabitable, killing the fish in the streams and bays, filling up the harbor, and in many other ways causing very great damage. . . .

In the State of Kansas, about 60 per cent. of the water supplies are derived from rivers or creeks, and in almost all of these cities the sewage is discharged into the rivers and streams without any regard to purification, and with no regard to whether or not the town below takes its water from the same stream. In the Neosha river of this State, ten towns secure their water supply, taking the water directly from the river, without filtration, and in all of these ten towns the sewage from them discharges either into the river below the town or into a branch, so

that eventually the sewage of the towns finds its way into the same channels that the drinking water is taken out of. The average distance apart of these ten towns along the Neosho river is fifteen miles, and an analysis of the water at almost any point will show sewage in some cases sufficiently diluted so that but a trace will show in the analysis, but in other cases the water is unfit for domestic uses. As these cities grow larger in population and factories are built up, it can be imagined what the condition of the water supply will become in time. . . .

Every water works system, using surface water, should be provided with a filtration plant for the purification of its water. This fact is recognized by almost every water works superintendent, owner and municipality, although few of them realize that there is just as much need of a plant for the purification of the sewage as there is for the purification of the water. Hardly any town would recognize the need of purifying sewage until some town below would bring suit for damages against the town above. For this reason, State Boards of Health and State officials should take into account the protection of the health of the entire State, by the passage and enactment of laws that would protect our water supplies. As no municipality will purify its sewage for the benefit of the town below, State authorities should control and protect the water supplies. Perhaps the best example of such legislation has been in the state of Massachusetts, where the State Board of Health has succeeded in securing laws preventing raw sewage being discharged into a stream where drinking water is taken out. Five other States have followed their example, and passed similar laws. . . .

It may be asked what benefits would be derived, by the owners of water works plants, from sewage disposal plants. Every corporation managing a water works plant has, for one of its objects, the making of interest on the investment for its owners. To offer the consumers impure water, while charging a sufficient price for good, pure water, is a common practice in many of our water works plants, the owners feeling that they cannot afford the cost of a purification plant. However, in several instances, cities have found that the increased revenue, due

* From a Paper read before the Annual Meeting of the Kansas Gas, Water and Electric Association, October 14, 1905, by R. E. McDonnell, Sanitary Engineer, Kansas City, Mo.

to a purification of the water, was sufficient to off-set several times over the investment for the purification plant. If the management of every water works plant in the State would exercise its influence toward having all water supplies properly protected, the increased purity of the supply would no doubt be realized by the increased income from the sale of water. . . .

Sanitary science has made it almost possible to prevent typhoid and similar diseases, and city officials should be held responsible for their outbreak in a community. The process now most successfully used in the purification of sewage is that known as the septic tank method, a process perfectly simple and automatic in its operation. The sewage is collected in the lateral pipes and mains, as in any

system, but instead of discharging direct into streams it is discharged into a tank built of concrete or brick, of sufficient size to allow the sewage to pass at a slow rate through the tank, and while the sewage is in the tank the solid matter is liquefied by bacteria that thrive upon the sewage. The process is one of Nature and is not dependent upon a superintendent or inspector, and works continuously. The bacteria form a light colored scum on the surface of the sewage. It is claimed that in a number of septic tanks a purification of as high as 90 per cent. has been obtained, and for a greater purification the sewage is discharged upon a filter bed or intermittent filter, which has the effect of oxidizing the effluent from the tank.

MUNICIPAL FINANCIAL MANAGEMENT

UNDER this caption, Mr. W. E. Gunn, City Engineer, Covington, Ky., contributes to *Rock Products* (Louisville, November) an article describing what it is possible to do in the line of city improvement while refraining from committing its inhabitants to the consequences of bond issues. After referring to the city as having 50,000 inhabitants and emphasizing the principle of "simplicity" which has been its key-note for ten years, he writes:

"It is not claimed that every official during the long period of ten years was a model of virtue, nor is it necessary to this story that even a majority of them were able and honest men.

"In 1895, when the great panic was at its worst in the Middle West, this city was loaded up with a heavy debt, and like all Western and Southern communities, its condition was stagnant, property unsalable, rents low and difficult to collect. The improvements the city owned had been built on credit, and the outstanding bonds nearly equaled the value of their assets. These circumstances forced the city for the next three or four years into a system of conservative management. Some of the debt was paid off, notably bonds bearing a high rate of interest.

"With the revival of trade throughout the country, came a desire on the part of the people for a more active policy in regard to the improvements of the city, especially on account of the neglected condition of the streets. By spreading the expenditure over three seasons' revenues, a good, new city hall had been built and paid for. Some money was apportioned to street building and by the time this work was well begun, a bond issue was submitted to a vote of the people and earnestly advocated by the leading city authorities. But there were a few men who did not believe in bond issues. They were imbued with Benjamin Franklin's idea of simplicity, and making use of the heavy debt already in effect as an argument, they were able to prevent the credit being voted. From that time on, no bonds have been issued. It was not

anticipated by the opponents of the bonds, that defeating the bond issue would prevent the street building. As a matter of fact, the work has gone right along, constantly increasing. More streets have been improved than the bond issue provided for. The sewer system has been greatly improved and extended. During the ten years time, the use of the sewer system has more than doubled. The quantity of paved streets has doubled. The necessity for all this improvement to be paid for out of the revenues, compels economy. The tax rate has not been higher than in former years, but has remained nearly stationary, showing lately a tendency to become lower.

"Now, to sum up what has been done: For ten years no bonds have been issued. The city has maintained an active system of street and sewer improvements. It has improved the water works and reduced the price of water to the consumers. It has maintained a good police and fire department. It has paid off more than \$400,000 of debt, the indebtedness per capita being now \$44.00 as against \$60.00 per capita ten years ago. It has added to its school capacity, and has increased the apportionment for school purposes.

"It is hardly necessary to assert that good results and prosperous conditions have followed such a period of judicious management.

"Some two thousand years ago, Plutarch, describing the good conduct of affairs by a tedious reformer named Cato the younger, when he was quaester (auditor) of Rome, says that by being watchful of what was owing, and keeping the exchequer pure, "He made it appear the State might be rich, without oppressing the people."

"In a similar manner the details of this modern instance have been cited to show that it is possible to obtain good results in a direct, common sense manner, and that public works can be obtained even when the condition of a municipality makes an increase of debt inadvisable."

PAYMENTS FOR STREET IMPROVEMENTS*

We published, in November, some data bearing upon the character and cost of street improvements in American cities, the first part of our article having special reference to the incidence of cost, whether by assessments upon owners or by the city treasury. We are now able to supplement the information then given by the following details, which include population and, wherever possible, the mileage of improved streets in each case.

The following cities pay for street improvements by assessments upon the abutting property:

Chicago, Ill., 1,698,575, (1,448 miles); St. Louis, Mo., 575,238 (590.6 miles); Buffalo, N. Y., 352,387 (363.7 miles); San Francisco, Cal., 342,782 (221.4 miles); Detroit, Mich., 285,704 (362.1 miles); Minneapolis, Minn., 202,718 (104.5 miles); Kansas City, Mo., 163,752 (201.4 miles); Rochester, N. Y., 162,608 (135 miles); Denver, Colo., 133,859 (31 miles); Syracuse, N. Y., 108,374 (47.7 miles); St. Joseph, Mo., 102,979 (51.3 miles); Albany, N. Y., 94,151 (82.8 miles); Portland, Ore., 90,462 (144.1 miles); Grand Rapids, Mich., 87,565 (172.3 miles); Camden, N. J., 75,935 (75 miles); Evansville, Ind., 59,007 (36.2 miles); Elizabeth, N. J., 52,130 (4.46 miles); Kansas City, Kan., 51,418 (54.2 miles); Harrisburg, Pa., 50,167 (39 miles); Ft. Wayne, Ind., 45,115 (31 miles); Saginaw, Mich., 43,345 (53.3 miles); Lincoln, Neb., 40,169 (23.5 miles); Spokane, Wash., 36,848 (9.3 miles); Terre Haute, Ind., 36,673 (88.7 miles), and Pueblo, Colo., 28,157 (2.6 miles).

In the following cities street improvements are paid for out of the general tax receipts:

Boston, Mass., 560,892 (494.6 miles); Providence, R. I., 175,597 (231.8 miles); Worcester, Mass., 118,421 (55.8 miles); Memphis, Tenn., 102,320 (22.6 miles); Lowell, Mass., 94,969 (126.3 miles); Cambridge, Mass., 91,886 (96.9 miles); Richmond, Va., 85,050 (length not reported); Lynn, Mass., 68,513 (14.6 miles); Springfield, Mass., 62,059 (56.7 miles), and Somerville, Mass., 61,643 (67.2 miles).

Of the cities in which street improvements are paid for by a combination of the above two methods, the following are given:

Baltimore, Md., 508,597 (491.2 miles). New Orleans, La., 287,104 (204.9 miles), has two systems for paying for street improvements, the first of which refers to im-

provements upon petition and on unpaved streets, when the city pays the cost of the street intersections and one-quarter of the cost of the paving between the intersections, except upon a "neutral ground"* street, when the city pays one-third of the cost of the paving between the street intersections. If a street is repaved upon petition, the city pays only for the street intersections. If the improvement of an unpaved street is demanded by the city, the cost is divided as on petition, but where the repaving of a street is so demanded the city not only pays for the street intersections but also one-quarter of the cost of the paving between the intersections in the case of an ordinary street, and one-third of the paving between the intersections on a "neutral ground" street. In Columbus, O., 125,560 (121.6 miles), the city pays the cost of street intersections and 2 per cent. of the remaining cost of the paving. In Paterson, N. J., 105,171 (78.1 miles); Atlanta, Ga., 89,872 (63.4 miles); Hartford, Conn., 79,850 (97.5 miles), and in Altoona, Pa., 38,973 (10.4 miles), one-third of the cost is paid out of the general tax receipts and the remaining two-thirds from the property benefited. The city of Seattle, Wash., 80,671 (46.2 miles), pays 15 per cent. of the cost out of the general fund, the remainder being paid by assessment upon the abutting property. Troy, N. Y., 75,057 (47 miles), pays out of the tax receipts one-half of the cost if the street to be improved is forty feet or over in width, the remaining half being obtained by assessment on the property benefited. Trenton, N. J., 73,307 (29.7 miles), meets one-fifth of the cost out of the general tax receipts and the balance by assessing the property owners. In San Antonio, Tex., 53,321 (8.9 miles), an unusual method is employed for securing street improvements, the citizens forming districts and taxing themselves from five to twenty-five cents on each \$100 assessed valuation.

* The very wide streets of New Orleans, particularly those upon which there are single or double street car lines, have built in the center of them, for purposes of embellishment and to minimize the cost of paving, cleaning, etc., a ground space varying from ten to fifty feet in width, elevated from one to two feet above the roadway surfaces and planted with grass, shade trees, and sometimes with small garden shrubbery. These strips are called neutral ground. While the origin of the title is probably lost, it may be presumed that the term has grown out of the servitudes owed by abutting properties on streets, which, in case of ordinary streets, extends on both sides of the street from the property line, across the sidewalk, and out to the center of the street; as the servitude does not extend beyond the limits of the actual roadway, the space was probably termed "neutral," meaning that no servitude was owed to it by the properties on either side of the street.

MINNEAPOLIS BRIDGES

SPECIFICATIONS are being prepared by City Engineer Andrew Rinker of Minneapolis for the reconstruction and widening of the bridge across the Mississippi river at Washington avenue South. The 18-foot roadway, about 800 feet in length, is now occupied by the tracks of the Street Railway Company, and it is proposed to double

the width of the structure.

A similar bridge at Lake street, in the southern part of the city, is undergoing similar alterations at the cost of the Street Railway Company, which is desirous of using the structure for a third interurban line between St. Paul and Minneapolis.

FIFTEEN REASONS WHY

PROFESSOR FRANK PARSONS, of Boston, well known as an authority on social-economic questions, has recently formulated fifteen reasons why public utilities should be owned and operated by the people, laying particular stress upon the gain in economy of production which he believes to be inherent to public ownership. These reasons are:

"1. A public plant does not have to pay dividends on watered stock.

"2. It does not have to pay dividends even on the actual investment.

"3. It does not have to retain lobbyists, or provide for the entertainment of councilmen or legislators or subscribe to campaign funds, or bear the expenses of pushing the nomination and election of men to protect its interests or give it new privileges, or pay blackmail to ward off the raids of cunning legislators and officials and others.

"4. It does not have to advertise or solicit business.

"5. It is able to save a great deal by combination with other departments of public service. Speaking of the low cost of electric light in Dunkirk, the mayor of the city says: 'Our city owns its water-plant, and the great saving comes from the city's owning and operating both plants together.'

"6 Full public-ownership (that is, public-ownership free of debt) has no interest to pay.

"7. Even where public-ownership is incomplete, the people not owning the plant free of debt, they still have an advantage in respect to interest, because they can borrow at lower rates than the private companies have to pay.

"8. As cities usually act as their own insurers, public-ownership is free of tribute to the profits and agency-commissions of private insurance companies.

"9. There is often a large saving in salaries. A public plant pays its chief well, but does not pay the extravagant salaries awarded by millionaire monopolists to themselves or their substitutes in office.

"10. Public plants frequently gain through the higher efficiency of better treated and more contented labor.

"11. The losses occasioned by costly strikes and lock-outs do not burden the ledgers of public works.

"12. Damages and costs of litigation are likely to be less with public than with private works. Accidents are fewer in a system that aims at good service and safety, and treats its employees well.

"13. The civic interest of the people leads to other

economies through the increase of patronage and the lessening of waste. The larger the output, the lower the cost of production per unit of service, other things equal, and the tendency to waste electricity, water, etc., is much less when the people know that the service is a public one, the profits of which belong to them, than when they know that the service is rendered by a private corporation charging monopoly rates and making big profits for a few stockholders. These economies are intensified as education and experience with public-ownership develop the understanding and the civic patriotism of the people.

"14. The cost of numerous regulative commissions and interminable legislative investigations into the secrets of private monopolies would be saved by the extension of public-ownership.

"15. Legislation would cost us less were it not for the private monopolies. For a large part of the time and attention of our legislatures is given to them."

He anticipates possible objections to the position thus assumed, in the following further statement:

"Private-ownership may claim an advantage through the payment of lower wages, but on broad grounds of public policy this is a very dubious advantage. It is like saving money by wearing paper clothes, or eating only one meal a day.

"Even on economic grounds the evidence is that in many lines of business the efficiency of well-paid labor is so great that the cost per unit is less than with poorly-paid labor.

"Moreover, it would be fair in many cases to compare municipal-ownership with private-ownership on the basis of the private wage, subtracting from the operating expenses of the municipal plant the excess of the public wage above the company wage for the same work, on the ground that the increase of pay under public-ownership is not really a payment for gas or electric-light or transportation, but an investment in manhood and civilization.

"But whether this is done or not, the experience of Glasgow, Liverpool and other English and German cities with municipal and private tramways in the same localities, and the experience of hundreds of cities and towns in this country and in Europe with municipal water-works, gas and electric plants, etc., abundantly confirms the conclusion pointed to by the above considerations as to the superior economy of public-ownership wherever it is tried under reasonable conditions that permit it to work out its natural and legitimate results."

THE SEATTLE CITY ESTIMATES for 1906 include \$30,000 for the construction of a municipal garbage crematory. No definite plans have yet been suggested or adopted, but City Engineer Thomson suggestively remarks that it will be patterned after a disposal plant operated in Europe. A plot of ground, near the shores of Lake Union, has already been selected for the location of this public utility.

SAN FRANCISCO'S NEW CUSTOM HOUSE, the contract for which has been awarded to Thomas Butler & Sons, for \$1,125,000, is to be completed within two years and a half. The installation of elevators, pneumatic tubes and heating and lighting apparatus will come under a separate contract. Mr. Joseph W. Roberts, of the Supervising Architect's Office, Treasury Department, Washington, will superintend the construction of the new building.

THE WATER WORKS FILTERS AT LAWRENCE, MASS.

THE following reference to the Lawrence City filters is extracted from the thirty-sixth annual report of the Massachusetts State Board of Health, reviewed at some length in another part of the present issue of THE MUNICIPAL JOURNAL AND ENGINEER:

"The Lawrence city filter, constructed for the purpose of purifying the sewage-polluted water of the Merrimack River and preventing the excessive death-rate from typhoid fever and other diseases resulting from the use of a polluted water supply, was constructed by the city under the advice of this Board in 1893. How successfully it has served its purpose is shown by the great reduction in the death-rate of the city in the years following the completion and use of the filter, as compared with the preceding years.

"The filter was designed to be of sufficient capacity for the needs of the city at the time it was built; but the original design, which included a cover or roof to protect the filter in winter, was not carried out, and its operation has been greatly hampered and its capacity limited on account of the impracticability of maintaining its surface in proper condition in cold weather. In the winter of 1901-2, the consumption of water in the city was for a period of several days greater than the capacity of the filter; and for a period of many days in that winter the water stored in the distributing reservoir was very nearly exhausted. Early in the spring of 1902, the Board ad-

vised the city of the urgent need of covering the filter, thus relieving it from obstruction from ice and snow and freezing weather, and to provide as soon as practicable an additional filtering area; but the only action taken by the city authorities was to divide the filter into three parts, by means of walls, by which a very little improvement was made in the operation of the filter. The winter of 1902-3 being a very mild one, enough water was obtained for the supply of the city. Nothing was done in the summer season of 1903 toward enlarging the works for supplying filtered water to the city or pure drinking water from any other source, though in the month of December plans for a new filter were finally submitted to and approved by the Board. In the winter of 1903-4 the distributing reservoir again became very nearly exhausted, so that, if a large fire or an accident to the works had occurred, it would have been necessary to introduce the sewage-polluted water of the Merrimack River directly into the city's supply mains. During the past summer, also, nothing has been done by the city to avert the calamity of introducing the unfiltered Merrimack River water, from which the city has twice barely escaped. The responsibility for the present conditions appears to rest upon the city government, which, in spite of the warnings given, has not seen fit to make provision for protecting the lives and health of the people of the city from the danger to which they are now exposed."

A SCOTTISH MUNICIPAL STREET RAILWAY

U. S. CONSUL FLEMING, of Edinburgh, deals in a recent report with the opening of a municipal electric street railway in the adjacent borough of Leith—this being a city of about 80,000 inhabitants. The works, which were opened early in November, have been constructed and equipped by the City Council and are now being directly operated by that body. "In October, 1904, the horse tramways, plant, and car depot owned and operated by a private company were purchased by the corporation for \$291,990. The electrification of the system, which extends to 12½ miles of single track, with single overhead wires, was begun in February and carried through in nine months under the immediate direction and supervision of the corporation engineer and other officers, no part of the work having been intrusted to contractors. The total cost is now found to be \$864,431, including cars and purchase price, which is \$14,599 less than the engineer's estimate. The most difficult part of the undertaking was the alteration of a swing bridge over an arm of the harbor, which often has to be swung round to allow of the passage of vessels. The overhead wires on the bridge receive the electric current through gun-metal

clips at either end.

"The raising of the bridge preparatory to its being swung round disconnects these wires, and when it is again placed in position the wires are charged by the two parts of the metal clips coming together. To prevent any possibility of a car running into the harbor when the bridge is swung, automatic "catch" points are placed in the street about fifty yards from the bridge. When the latter is swung to allow a vessel to pass, the points are automatically set in such a way that should an accident cause a car to get out of control, it will run to the side of the street instead of into the harbor. The thirty-six cars, which were purchased from the British branches of two American electrical engineering companies, are fully up to date in design and construction. The electric current is obtained from the corporation electricity station at 2½ cents per unit. In the matter of fares the lines are divided into sections. Fourteen sections have one-cent, five two-cent, four three-cent, and two four-cent fares. The average length of the one-cent sections is about half a mile. The longest route in the restricted area of Leith does not exceed two miles."

A PRIZE ESSAY

THE prize of One Hundred Dollars, offered by the National Lime Manufacturers' Association, for the best paper on "Lime versus Gypsum Plaster" has been awarded to Mr. R. S. Edwards, B.S., who deprecates the increasing tendency to use too large a proportion of plaster of Paris in plaster mixtures. Unlike the set of lime, the set of this material is a re-crystallization, accomplished in a few minutes and reaching its maximum strength in a few days. Lime, on the other hand, takes several hours to set and goes on gaining strength, sometimes for years. It is, as the Author points out, a simple matter "to apparently hasten the set of lime by mixing with it small amounts of plaster, and provided this amount of added plaster is small, it affects but slightly the smooth working properties and ultimate strength of the lime putty; but when the useful percentage has been over-reached, trouble will surely follow."

The Author does not ignore the various considerations which have operated in bringing about this excessive use of plaster; among these are the greater speed with which work can be got through, this being particularly the case when one or other of the "dry mixtures" now on the market is used. But he argues that "lime in its hydrated form is the best and in fact the only condition in which it can be used in dry wall plaster formulæ." That must be had "in a form that will keep and retain its strength indefinitely, and that will not swell in the bag. It must also be in a finely divided, uniform condition, and as the hydrated form of lime is the only one form that will ful-

fill these requirements, it is, therefore the only form we can use in these mixtures. Why is it that the standard Portland cement specifications call for a product fine enough to pass through a 50-mesh sieve, and all but 10 per cent. must pass a 100-mesh sieve? Why do paint consumers insist upon fine grinding of the paint body in oil? What adds to the strength and hardening properties of hydrated lime, and enables it to take four to five parts of sand? It is just this element that so many have missed or not considered of enough importance to mention—the element of being in a finely divided, uniform condition. It increases the covering capacity, hence the strength of the Portland cement; it increases the covering capacity of the paint, and for the same reason it increases the strength and sand-carrying capacity of the hydrated lime."

The paper discusses the requirements of plaster work in its various branches, and enters at length into the reasons which dictate certain mixtures for scratch coats, float finish and other requirements. The chemical composition of lime from different sources is examined and the subject is treated throughout with a degree of thoroughness and research which, it is quite possible, may have come as a surprise to members of the adjudicating committee. We are indebted to Mr. Charles Warner, of Wilmington, Del., President of the Association, for the opportunity of going through the pages of a pamphlet which will repay careful study by those directly and indirectly concerned in the use of these materials.

MUNICIPAL STREET RAILWAY PROFITS

ONE of the strong points of municipal ownership in Great Britain is the reduction of "rates"—local taxation—brought about by the application of profits, in whole or in part, to this purpose. There have been indications of late, some of them referred to in these pages, that this course might have to be modified in consequence of the necessity for making larger allowances for depreciation and, in some instances, for raising the short stage fares in order to establish an equilibrium between income and expenditure—the latter including the repayment of instalments of capital, with interest. In Manchester, where the sum of \$250,000 is annually devoted to the reduction of rates by drawing upon street railway profits, opposition to the system has been manifested by the Chairman of the City Tramways Committee, who urges that these profits are derived from the man who pays a penny (two-cent) fare and uses the cars only for short distances. He believes that the money should go to the street railway patrons and not to the city treasury. The (London)

Municipal Journal, commenting on the Chairman's utterances, says that he is quite right in the attitude assumed. "The only thing to be said on the other side is that if profits were not made our opponents would say that municipalities are unable to make them. The commercial person cannot see profits in any other form than balances available in the ordinary course for dividends. It must not be supposed, however, that Manchester has earmarked all the profits for the rates. The Corporation has made concessions to the men in uniform, holidays, and shorter hours, at an estimated cost of \$250,000 a year. It is estimated that concessions made to the traveling public represent another \$250,000 a year. If this \$250,000 be added to the \$1,100,000 profits of last year, the gross profits amount to about \$1,600,000. Leaving these concessions out of account, there is, after allowing for interest and depreciation, an actual profit of \$675,000, which in the case of a private company could be distributed amongst the shareholders."

"SURFACE-CONTACT" STREET RAILWAYS

U. S. CONSUL MAHIN, of Nottingham, sends a report dealing with English attempts to replace the overhead trolley system in street railways by what is known as "surface contact." The latter system has reached the stage when contractors for its installation will guarantee a city against loss and give bonds to install the "familiar trolley" if their surface system fails to give satisfaction. The case of Lincoln, a cathedral city with 50,000 population, is quoted in this connection, the work of installing the surface system being now in progress. "The line will be about a mile and three-quarters in length, eight cars will be used, and the entire cost will be about \$140,000. The system was adopted by the Lincoln City Council after long and careful investigation and consideration, and the securing of guaranties that place the Corporation beyond possible risk of loss, such, for instance, as an undertaking by the constructors of the line to equip it with the familiar trolley if their system failed to work satisfactorily. The system adopted is known as the "G. B. surface contact."

The initials stand for Griffiths & Bedell, the patentees. The inventor is Mr. B. H. Bedell, an electrical engineer. The invention was substantially completed in 1904, though some modifications have since been introduced. An experimental line has been operated near London for over a year, but Lincoln is the first town to adopt the system."

In regard to the contact principle in general, Consul Mahin writes as follows: "A dozen or more surface-contact systems have been tried and submitted to the judgment of tramway engineers and municipal authorities, but, if I am correctly informed, the "G. B." is the first British invention to be adopted for practical use in this country. It is claimed, being the latest, to have eliminated all the faults discovered in other systems and to be as near to absolute perfection as is possible. An American surface-contact system, the Lorain, has been operated at Wolverhampton for the past three years. The last report of the tramway committee of that city's council says the operation of the system has been satisfactory."



Courtesy of the Metropolitan Paving Brick Company, Canton, Ohio.

PUBLIC SQUARE, CANTON, OHIO.—PAVED IN 1890, PHOTOGRAPHED IN 1905

SCHENECTADY, N. Y., anticipates for 1906 a surplus of \$52,000 from its city waterworks, out of which \$25,000 will be taken for extraordinary expenditures on raising standpipes.

TROY, N. Y., is being pressed by the State Board of Health to adopt measures for purifying its sewage before its discharge into the Hudson. Meanwhile, permission to construct three proposed sewers is withheld.

CONCRETE IN RESERVOIR DAMS

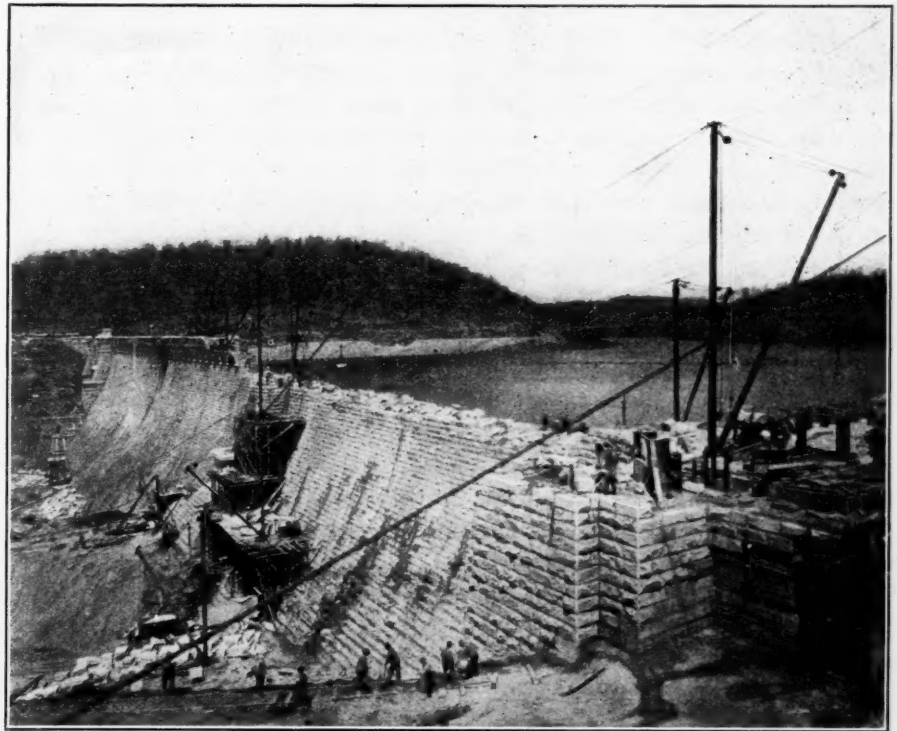
MR. CHARLES S. GOWEN, M. Amer. Soc. C. E., Division Engineer on the new Croton dam, contributes to *The Cement Age* an article dealing with the use of cement in this class of work, the adoption of economical sections of masonry having been greatly facilitated by recourse to this material. Engineers have been led to adopt and use such sections because of the growing confidence in cement as now manufactured, this applying not merely to the high burned Portland but, under appropriate conditions, to the light burned natural cements. The latter has been used in the Croton and Wachusett dams "for the masonry in the foundation and lower portions of the sections at such points as were not to be subjected to strain for a considerable length of time." The following extract from Mr. Gowen's article gives a concise description of the work now in progress for augmenting the supply of water to New York, with details as to the methods of using the two classes of cement:

"The new Croton dam is, perhaps, one of the most notable examples of the use to which cement, as a building material, and essential factor in the structure, has been put. This masonry structure is about 2,000 feet long, has foundations which extend, at the deepest point, about 150 feet under ground; its highest elevation above ground is about 150 feet. Thus the maximum height of the masonry dam section is 300 feet and the maximum thickness at the base of the section is above 200 feet. The total amount of masonry in the structure is more than 800,000 cubic yards. This amount of masonry is the greatest extant in any one structure, if the Pyramids of Egypt be excepted.

"The dam when completed will impound 30,000,000,000 gallons of water, and, while not quite finished at present writing, has been in use for some months to impound and supply water to the city of New York, the depth of the impounded water varying at the deepest point from 110 to 120 feet; the depth of water when the basin is filled to the crest of the overflow of the dam will be 150 feet.

A GIFT OF \$15,000 has been made by James J. Hill, President of the Great Northern Railway, a resident of St. Paul and New York, to the Park Board of the former city, to be applied towards the construction of a boulevard between St. Paul and Minneapolis along the Mississippi river bank. This project has been the dream of both cities; but money has never been available for buying land for a right of way.

"As to the methods of use of cement in this structure it may be said that it was principally used as mortar for the rubble stone masonry which forms the hearting of most of the dam. The south end of the structure, however, was built of cyclopean masonry of large blocks of stone embedded in concrete. Both the up and down stream sides of the dam where exposed were, for the most part, faced with cut granite stone and the rubble



THE CROTON DAM

stone and cyclopean masonry alluded to form the hearting or body of the dam, as distinguished from this facing.

"Natural cement was used very largely in the foundations and lower portions of the dam section, except at the south end where, as above stated, cyclopean masonry was used from the foundation upwards. For natural cement mortar two parts of sand to one part of cement were used. For Portland cement mortar three parts of sand to one part of cement were used for rubble masonry laid in freezing or cold weather and also for the whole of the upper 60 or 70 feet of the dam section, while for the cyclopean masonry the concrete used was a 1:2:4 mixture with Portland cement."

THE BOROUGH OF BETHLEHEM, PA., has closed a long-standing dispute with the local electric lighting company by entering into a contract in which definite rates for street lighting are incorporated. The price per arc lamp is to be 23 cents per lamp night, and incandescent lamps will be charged \$18 per annum. The borough authorities agree to use not less than 137 arc lamps and 52 incandescent lamps.

STREET TRAFFIC REGULATIONS

AN ordinance which has been referred to committees by the City Council of Cleveland, Ohio, proposes drastic changes in the present rules for the regulation of street traffic in that city. It embraces street cars, drays, wagons, hackney coaches, omnibuses, automobiles and every description of carriage kept for hire or livery purposes or soliciting or transacting business. It has been approved by a special committee of the Chamber of Commerce and makes provision for the following conditions upon every class of roadway in the city:

Vehicles shall keep to the right side of the street, except when necessary to turn to the left in crossing or in overtaking another vehicle. Vehicles shall pass each other on the right; those overtaking shall keep to the left of the overtaken vehicle in passing.

Vehicles moving slowly shall keep as close as possible to the curb on the right, allowing others free passage on their left. Drivers of vehicles in the built up portion of the city, before turning, stopping or changing their course, shall make sure that such movement can be made in safety and shall extend and wave the right hand outside the carriage as a signal to persons driving vehicles behind them of their intention to make such turning.

Vehicles turning to the right into another street shall turn the corner as near to the right hand curb as possible. Vehicles turning to the left into another street shall pass to the right of and beyond the center of the street intersection before turning.

There are sixteen other similar rules which prohibit, among other things, the stopping of vehicles in the congested districts with the left side to the curb; prohibiting driving through processions; giving right of way to vehicles on main thoroughfares over those going on in-

tersecting streets, except vehicles on main thoroughfares running in a general east and west direction, which shall have right of way over those on intersecting main thoroughfares.

The ordinance also prohibits the crossing of any main thoroughfare or the making of any turn thereon at greater than half the speed allowed by law on the thoroughfares. Vehicles must be four feet away from the running boards of street cars when these are standing still for the purpose of discharging or taking on passengers. Vehicles using the boulevards or parks at night shall carry a light on both sides, visible 200 feet in front and 50 feet in the rear.

Except in the market district and in cases of actual loading or unloading, no vehicle shall remain backed up to the curb in the congested district between the hours of 8 A. M. and 6 P. M., and even in cases of loading or unloading not more than thirty minutes, and must also move at the request of a police officer, the driver of another vehicle or the owner of abutting property. Vehicles must not stand in street intersections or at a crosswalk or sidewalk longer than to permit occupants to alight. Drivers of vehicles must also stop upon a signal from any police officer.

Main thoroughfares are designated as streets or parts of streets upon which cars run; also the parts of certain specified streets which are without car lines. Congested districts principally include all the down-town business districts and the small centers throughout the city. The built up portion of the city is described at length.

Violation of the ordinances is to be punished by a fine of not less than \$10 nor more than \$100, or imprisonment not more than thirty days, or both.

A PUBLIC HEATING PLANT

U. S. CONSUL IFFT, of Chatham, Ont., reports the opening of a public heating plant in that Canadian city and describes the owning and operating company as an offshoot of the Chatham, Wallaceburg and Lake Erie Railroad Company, the exhaust steam from the railroad company's power house being used by the heating company. "About a mile of mains has been laid, and several churches, schools, hotels, office buildings, as well as business houses and private residences, are connected with the mains. The main pipe through which the steam passes is an iron one. It is wrapped in asbestos, and this again is inclosed in a tin tube. Outside the tin tube there is an air cushion, and outside of that again is a wooden covering, which is bound with wire, and the whole treated with creosote and other materials. In this way a durable and cold-proof tube is secured. At short intervals there are condensing valves, which make up in themselves the bulk of the cost of laying the pipes, which amounts to \$8 per foot. The

pipes are laid in a rather peculiar manner, the depth varying from four to six feet, in order to allow a sufficient slant for drainage, for a little water is sure to condense in the tubes. This runs off into the sewers.

"The steam has just been turned into the mains, but whether the rates fixed will lower the heating expenses of the users has not yet been demonstrated. They will, however, be saved the trouble of paying men to look after their furnaces or of doing it themselves. It is expected, however, that there will also be a considerable reduction in insurance rates, because of the absence of fire in the buildings. The rates are made up in two ways. On the flat rate the charge is based on the number of cubic feet in the building to be heated, and varies from \$3 to \$5 per hundred feet, according as there are one or more sides exposed to the weather. On the meter system the charge is at the rate of fifty cents per thousand pounds of water condensation."

MUNICIPAL OWNERSHIP IN EDINBURGH

IN a recent report, U. S. Consul Fleming, of Edinburgh, deals with the results attained by that city in the ownership of the street railway and electric lighting plants. The former undertaking, then consisting of horse-car lines, was in the hands of a private company until 1893, when it was acquired by the city at a cost of \$1,654,610. During the next six years the cable system was installed, with the result that the present total of 21.68 miles of double track, including power houses, equipment, street widenings, etc., has cost the city \$6,326,450. The entire system was leased to a private company in 1899 at a rental of 7 per cent. of the total expenditure of the city on tramways account, the lease fixing the maximum rate of fare to be charged on the basis of 2 cents per mile. The lines have been yielding a net profit of considerably over £100,000 (\$486,650) per annum. For the current year the gross receipts are expected to exceed £255,000 (\$1,240,957). In regard to the value of the tramways to the corporation, the Town Clerk of Edinburgh says:

"The results attest that the undertaking has capacity for expansion of traffic and forms an asset of enormous value. With the exception of a sum of \$26,765 per annum, which is paid out of the tramway rent as a contribution to the city rates in lieu of rent for the streets, the net rent is being applied in meeting the interest and providing a sinking fund for redemption of the tramway debt. If that course is continued until the lease terminates, the greater part of the tramway debt will have been redeemed from the tramway revenue. If the same traffic could have been carried on, and presumably the same profit earned, by a system which cost only one-half of the cable expenditure, then the lessees would have had upward of \$194,660 per annum of clear profit, which they now pay in rent to the corporation. It is not so much the corporation as the lessees who are to be commiserated, if it be the fact that one-half of the expenditure was unnecessary. The lessees plainly do not believe this. With care in the selection of tramways to be constructed and prudence in capital expenditure there is every prospect that the result will vindicate the wisdom of the corporation in keeping the ownership of the tramways in their

own hands and not giving it up to companies. The city rates have not been called upon to pay anything for tramway purposes, but, on the contrary, they have received about \$194,660 in contributions to the rates, in addition to being relieved of the expense of certain street widenings, and of the formation and maintenance of the streets, within the tramway rails and a certain distance outside.'

"The fares charged by the operating company average somewhat less than two cents a mile for distances exceeding one mile. For short distances—one mile or under—the charge is two cents. Roughly speaking, tramway fares are from 50 to 60 per cent. higher in Edinburgh than in Liverpool or Glasgow."

The electric lighting system, on the other hand, is operated directly by the city, which has invested a total of \$4,366,686 in the undertaking during the past ten years. The net revenue for the year ended May 15, 1905, was \$578,867. The counter charges and other figures for the same period were "costs, excluding interest and sinking fund payments, \$235,886; interest on capital expenditure, \$104,079; sinking fund for repayment of capital expenditure, \$136,018; net profit before placing anything to reserve fund, \$102,884; reserve fund, \$83,192; units sold, 11,648,501; total cost per unit sold, excluding interest and sinking fund, 1.998 cents; price charged per unit for private lighting, 7 cents; for power, 2½ cents; for public street lighting, \$53.53 per arc lamp per annum; number of arc lamps, 998; number of 8-candlepower lamps connected, 743,331; number of consumers, 8,334. Of the net profits, the sum of \$19,695 was credited to city rates and taxes.

"In 1896 the charge for private lighting was 12 cents per unit, for power 7 cents per unit, and for arc lamps \$97.33 per lamp. By the Act of Parliament authorizing the electric-lighting scheme, the corporation is empowered to provide a reserve fund and accumulate the same until the fund amounts to one-tenth of the aggregate capital expenditure, 'which shall be applicable to answer any deficiency at any time happening to the income of the undertaking, or to meet any extraordinary claim or demand arising against the undertaking.' This reserve fund now stand at \$379,580."

BITULITHIC IN ST. LOUIS

THE Springfield, Ill., *News* of November 25 gives prominence to the opinions expressed by Mr. John C. Lanphier, Jr., after his return from an inspection of the plant of the Granite Bituminous Paving Company, in St. Louis, and of the bitulithic pavements laid and being laid in that city. "He says the pavement is a wonder, possessing all the noiseless qualities and resistance of asphalt and being, in addition, harder, more durable, easier to clean, waterproof, and possessing a slightly roughened surface, which largely prevents the slipping and skidding to which

vehicles on wet asphalt are so liable. He had frequent opportunities of comparing this pavement, of which there are twenty miles in St. Louis, with asphalt and brick pavements of similar age, and in every instance the comparison was altogether favorable to the "bitulithic." Lindell Boulevard, leading to Forest Park and the Fair grounds, was paved with this nearly three miles, and is one of the handsomest streets in the city. Chestnut street, which is fourth in the country in the amount of traffic, is paved with it, and is giving absolute satisfaction."

MUNICIPAL JOURNAL AND ENGINEER

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It is also desired that the facilities furnished by the reference library in this office should be widely known and freely used by those interested in municipal affairs. Visitors will be welcomed and provided with conveniences for search, and inquiries by mail will be promptly dealt with.

NEW YORK, JANUARY, 1906.

IMPORTANT NOTICE.

THE MUNICIPAL JOURNAL AND ENGINEER has acquired the weekly and monthly publications known as MUNICIPAL NEWS, and has incorporated with them the Weekly Advance News Supplement of the JOURNAL. The monthly issue of the latter, which will be maintained in its present form, will be mailed to MUNICIPAL JOURNAL and MUNICIPAL NEWS subscribers.

The Metric System

AN agitation which has been started in a New York daily in favor of the immediate and wholesale adoption of the metric system follows the too common course of missing the real necessity of the case. This is, as we believe, to get rid of the perplexing array of local and other measures, whether of length, weight or capacity, and to decimalize the subdivisions of the units ultimately selected for adoption in their stead. Instead of concentrating their efforts upon a scheme of this reasonable and practicable character, the advocates of the metric system glibly assume the existence of some mysterious and awe-impelling advantage in that inter-relation of metric standards which, if the truth be told, is merely the result of a concession to the French passion for academic unity and logical completeness. On paper, a plausible case can be made out for the alleged scientific simplicity of being able to refer such diverse factors as the length of a piece of cloth, the weight of a winter's coal and the volume of a cask of beer to a mythical proportion of a particular geographical meridian. In practice, this vaunted unity is not the life-giving feature which the metre-at-any-price people vainly imagine. It is in the universal and compulsory decimal sub-division that the merit of simplicity is to be sought and, granted that a suitable choice of units were made from the formidable list available to English speaking races, the same merit can be realized from these as from an alien standard which appears to exercise, upon many minds, the influence exerted by "that blessed word, Mesopotamia" upon a certain estimable female.

We have no intention of minimizing the inconvenience

and loss entailed by the present heterogeneous jumble of barleycorns, firkins, yards, gallons and feet. On the contrary, we maintain that an end should be made of all but a necessary survival of antediluvian monstrosities which lag superfluous upon a stage too small to give scope to their fearful and wonderful capabilities. But this attitude does not carry with it the conviction that the metre should be chosen as their successor, especially when, as has frequently been urged by practical men, that standard labors under serious disabilities, in its linear side in particular. Among these are, on the one hand, the excessive length of the metre and, on the other, the unsuitable character of the millimetre as its smallest subdivision in a practical sense, the inch, or the tenth of a foot, lending itself much more readily to fine work. And as the item of loss has been mentioned, it might be apposite to ask what consideration has been given to the enormous cost involved, to manufacturing interests, in the changes necessary to convert machinery and gauges to the new standard.

A Vicious Method

WE reproduce, in another column, part of the *Engineering Record's* comment upon the invitation issued by a Pennsylvania borough, in response to which its authorities hope to be furnished with gratuitous plans for a sewerage and sewage disposal system. Since the appearance of the *Record* article, we have fallen in with a copy of the "General Instructions to Bidders," issued by the Chairman of the Street Committee, which begins with the information that the borough in question "has no sewerage installation or disposal plant" and that it will graciously "entertain proposals and plans for a proper sewerage installation, constructed to care for domestic sewerage (*sic*) only, and purify the same." Bidders are informed that they "must prepare their own general plans, showing what they propose to do; and also their specifications, describing the same, as well as their bids for costs." Bids are to be divided into two parts, one for a sewerage system discharging into a convenient river, the other for a purification system; for the latter, a pumping installation will be required.

The customary provision, under which the authorities are absolved from any obligation to accept any bid, forms a part of these instructions; information on which we rely leads us to the conclusion that more than ordinary reason exists for this inclusion, in the fact that no appropriations have been made for the suggested work. If this be so, the already stupendous assurance of the local authorities, in asking for bids at all, becomes colossal in proportions, for it is then clear that the whole scheme is simply to get the plans of various engineers together as a basis on which to begin the study of the problem. Comment upon such conduct is as superfluous as it would be valueless, so far as any effect upon the framers of this document is concerned, but it may at least be hoped that no reputable engineer will so far forget what is due to the profession of which he is a member as to accord the smallest recognition to the attempted imposition.

Departmental Control

THE control exercised by British Governmental Departments over the activities of municipal and other local bodies is exemplified by a recent decision of the Local Government Board. One of the functions of that body is to hold inquiries in regard to loans required by local authorities for carrying out public improvements in their respective areas. Its somewhat extensive powers in determining such points as the period over which loans shall extend are supposed to carry with them some guarantee as to the wisdom of the sanctioned proposals but, in spite of that belief, it cannot be said that the exercise of these powers has ever been an agreeable feature of English local government. What appears to be regarded as an unwarrantable extension of them has come to light at Hornsey, a large municipality of the metropolitan suburbs, where it was proposed to borrow money for side-walk construction in which slabs of clinker and cement were to be used. These slabs are the product of a municipal plant installed for utilizing the crushed clinker from the municipal refuse crematory and it is understood that no objections to them, on the score of quality, was raised by the central board. But that body withholds its sanction to the entire loan, although the amount applied for did not include the value of the slabs.

It is possible, of course, that the action taken is due not so much to any objection to the material or to the financial methods involved in the transfer of values to different accounts as to a desire to restrict local borrowing to a more reasonable figure. In that case, it might be described as a case of locking the stable door after the disappearance of the steed, seeing that the rapid increase of English local indebtedness during the last few years is among the most serious of the troubles with which the country is confronted. In any case, the conditions disclosed have an interest for those who, properly jealous of American local rights, may find it difficult to realize the necessity of institutions which, in England at any rate, have become a part of the price paid for purity of civic administration.

Victory in Sight

THE efforts made by Mayor Johnson, of Cleveland, to secure for the citizens the boon of three-cent street railway fares have been resisted in every possible way by the Cleveland Electric Railway, whose right to operate on Central avenue expired last March. In anticipation of that date, the city granted, two years ago, a franchise to the Forest City Railway Company to construct and operate a street railway, the fare to be three cents, but the matter has been tied up in the courts with many different suits, of which, however, only one now remains to be settled. When this has followed the rest, the company will be able to complete the building of the road and, if we may judge from the confident tone of local opinion, the three-cent fare will be an established fact within the present year. The event will mark an important inroad upon the firmly established five-cent principle which has hitherto been a feature of American street railway practice.

A Hint to Writers

Engineering News (New York, October 26) in an editorial referring to a descriptive article in its columns, calls attention to "the one-sided development of engineering literature. The professional literature available for the instruction of the engineer is surely voluminous enough at the present day. No one better appreciates that fact than the busy editor. Every mail brings its heavy burden of technical periodicals, papers read before engineering, scientific and trade organizations, to say nothing of original contributions, good, bad and indifferent. . . .

Very much of this mass is mere duplication of what has been done before, and it is an injury rather than a benefit to the profession, since it makes it just so much harder for the searcher to find really important and valuable matter. . . . The engineer, young or old, who can make some real contribution to professional literature in some of these untrodden fields, will find that he has accomplished far more for himself in the way of reputation than would result from any paper in the fields with which everybody is familiar."

Imposing on Contractors

UNDER this caption, a recent issue of the (Chicago) *American Contractor* animadverted upon the too common practice of asking payment, from contractors desirous of bidding for work, for copies of the plans and specifications essential to that purpose. This, our contemporary proceeds to say, "is all well enough where the proposition looks upon the sum so paid as a deposit to insure good faith on the part of the applying contractor, to be returned in the event of his submitting a *bona-fide* bid. To adopt any other rule would be to invite an enormous expense, since many would write for plans simply for the sake of securing them with a view to valuable suggestions they might contain, and with no idea of becoming legitimate competitors.

"But when contractors desiring to compete for business are compelled to pay for plans and specifications and that without any prospect or hope of return or rebate, the practice seems to assume the nature of an imposition. While the contractor is looking for business, the party chiefly benefited by wide competition is the owner. The very circumstance of his seeking competitive bids shows that he expects, or at least quite confidently hopes, to profit thereby; and no logical reason can be urged why he should not stand the necessary expense.

"On his own part, the competing contractor is subjected to considerable expense in preparing his estimates, and this, in many instances, may well run into the hundreds of dollars. This expense the contractor who desires to submit a bid must pay, yet there would seem to be as much sense in his demanding that the owner pay it as there is in the owner exacting from the contractor payment for plans which have been prepared for his own benefit.

"The reason usually advanced for demanding payment, without refunding or even rebating, is that otherwise great annoyance would be experienced from a flood of applications for copies of the plans and specifications. While this is doubtless true, it should be looked upon

as one of the necessary incidents of the business. Methods of avoiding the sending of plans to unpromising or poorly equipped contractors could doubtless be devised, and that without laying a heavy and decidedly unjust burden upon real and responsible contractors, who are in a position to take and execute contracts. This is a matter that ought to be taken up by associations of contractors, who have common rights and interests in the premises."

A Flagrant Case

THE special correspondent of our Pittsburgh contemporary, *Construction*, writes that journal, from Baltimore, as follows: "The building inspector has condemned forty-eight houses in course of construction in South Baltimore. The mortar used in the houses, he says, was nothing more than sand. The inspector has notified his assistants that if they permit the use of bad material they will be discharged. The erection of slightly and badly built small dwellings has been going on in Baltimore for a long time, and it is high time that it was checked." Commenting on the state of affairs here disclosed, *Construction* remarks that "what is true of Baltimore is also true of most cities. The building inspectors pay little attention to the materials used in small dwellings or small buildings of any description. There are so many large buildings being constructed at the present time that the inspectors feel somehow that it is a waste of time to bother much about the little things. Yet the small property holder, and the renter who can afford to pay only a small rental, have just as much right to official protection against imposition on the part of contractors and builders as the larger owners and renters, and the building inspectors are in duty bound to give them that protection. The practice of skimping in materials put into buildings of various kinds has become so general in many places that it is time the building inspectors were stirred up to their duty in this regard. Inferior materials and inferior workmanship mean danger in the long run to those using the building, and the department of building inspection is maintained by the various cities to obviate this danger. Baltimore is not alone in this matter, but it is to be congratulated on having a building inspector who is alive to his duty, and who will insist on protecting tenants as well as property owners, who are the taxpayers who pay his salary. It is to be hoped that building inspectors in every city will insist on similar action on the part of their assistants."

Municipal Street Railway Operation

A WRITER in the *Boston Evening Transcript* refers to U. S. Consul Griffiths' report on the favorable results of municipal ownership and operation in the case of the Liverpool street railways, summarized on page 289 of our December issue. While declining to pass judgment upon the accuracy of the Consul's conclusions, the writer thinks that attention should be directed to the experience of the London authorities in that field, as exemplifying the danger of drawing general conclusions from consular and

other reports of the same tendency. "The London County Council, after acquiring the ownership of tramways on both the north and south sides of the Thames, adopted two methods of operation. The lines north of the river were leased to a private company, while the Council itself worked those on the south. The capital value of the two systems was about the same—£850,000 in the north, £896,000 on the south. The mileage of the two systems was also of about the same length—the lines on the north side of the river being eighteen miles longer than those on the south.

"When the County Council took possession of these roads, the courts attributed to the Act of Parliament under which the lines were constructed a meaning which the shareholders had not foreseen, and the result was that the County Council secured the tramways at a price said to be much less than their real value. Having got the property on these favorable terms it was not difficult to show a profit from operation. This profit has amounted to £293,000, but Sir Melvill Beachcroft has pointed out that of this total profit over £200,000 has been received from the northern system operated by the private company, or over three times as much as has been received from the southern system worked by the Council itself. Here, then, is a case where in a single city there is opportunity to compare the results of public and private management, and the case is one of peculiar interest in Boston, because here the subways and the East Boston tunnel, which are the property of the public, are operated by a private company and that private company is admitted to have built up one of the best local transportation systems in the world."

A Perfect Garbage System

UNDER this caption, *Municipal Affairs* (Los Angeles, December) comments upon a system of collecting garbage which the city of Oakland, Cal., recently undertook to put in force and which, from a sanitary standpoint, was very nearly ideal. "Instead of sending around wagons with tanks, into which the garbage is to be thrown, Oakland undertook to work a system by which the full cans were carted off and clean ones left in their places. The wagon was a rack capable of carrying a large number of cans. The cans when emptied were given a thorough cleaning with a revolving brush and a steam jet. Collection was to be made once a week for garbage and once in two weeks for other forms of refuse. Once a week would be a too infrequent collection for an ideal system, as the garbage would undoubtedly rot in that time. A perfect system would pick up the garbage can every other day, leaving always a clean one in its place.

"The weak spot in the Oakland plan, however, and the point on which it finally failed, was that the work was neither done nor paid for by the municipality. Oakland had been using the scavenger system, by which the individual householder paid by the month for his garbage removal. A company proposed to put the system as described above into effect and provide a garbage incin-

erator and provide also the cans—which, of course, must be of uniform size—and charge the expense, 35 cents a month, to the householder. After a struggle of several months, the Oakland health authorities were obliged to abandon the fight. The original scavengers fought the so-called 'monopoly,' and managed to get enough of the householders on their side to discourage the company, whose revenue was insufficient for them to continue the business. So Oakland is now back to the old system of dumping the cans into wagons.

"There are some households where the garbage can is scalded out and properly cleaned every time it is emptied, but in the great majority of cases it is a filthy object, full of germs and ill smelling. The time will come when all well regulated American cities will use the clean can system—but it must be under municipal control, and will require a large outlay both for the original plant and for the expense of collection."

Salaries for Councilors

The Boston Herald, November 29, congratulates the city of Worcester on the failure of an attempt to secure salaries for members of the two branches of the city government. "We are confident," it proceeds, "that Worcester would lose rather than gain by the passage of such a bill and its acceptance by the voters of the city. Boston did not improve the make-up of her city council, especially of her board of aldermen, when she provided salaries for such officials. Worcester is a great and growing city and the handling of her municipal affairs takes a large amount of the time of citizens serving as members of the city council, but Worcester has not reached the point where she cannot find able men who are willing to thus sacrifice their private interests for the benefit of the municipality. In far too many instances it has been found that the larger the salary paid to members of a city government the poorer the quality of the men elected. This is frequently owing to efforts made to obtain such places largely for the salary and perquisites thus to be acquired."

Plain Talk

DR. R. M. SIMPSON, Chairman of the Provincial Board of Health of Manitoba, has addressed a communication to the Premier, in which he makes some strong statements concerning the administration of the sanitary laws in Winnipeg, the capital city. His strictures apply, *inter alia*, to the water supply and sewerage systems, and he has much to say in regard to the erection of buildings without any connection being made with either. "This," he proceeds to state, "is not as it should be, and is a retrograde step in accomplishing an appreciable improvement in the sanitary conditions of the city. What practical use is it, I ask, to require and insist that old houses shall be connected with water and sewer, if new ones are permitted to be erected without such connections being made? No appreciable result is accomplished, and the whole proceeding, therefore, is akin to the Irishman, who, desirous

of lengthening his blanket, cut a piece off one end and sewed it to the other.

"I most strongly condemn the action of those in authority in the city in sanctioning or allowing a most important provision of a most important by-law to be ignored, and become, as it is, practically a dead letter. This is not the way to improve the sanitary condition of a community. Vigorous and steady administration of the laws relating to public health untainted by favoritism, and regardless of the convenience or inconvenience of the individual, is the only means by which headway in this respect can be accomplished, and it is the duty of the city to put in force and operation the wide power given them at last session [of the legislature in requiring the connection of all new buildings in the city with the sewers and water mains. By-laws of a corporation are only useful if acted upon. They will not *per se* ward off disease or accomplish any result if only used as a scarecrow. Surely, with our boasted civilization and enlightenment, we do not place ourselves on a par with the Corean coolies, who, believing rats to be the carriers of disease, place silhouettes of cats on the outside of their houses for the purpose of frightening these animals away."

Municipal Purity

SIR ALBERT ROLLIT, President of the Association of Municipal Corporations, made the following reference to American conditions in an address delivered at the autumn general meeting of that important English body. It may be well to state that the word "corporation" is used in England to express the idea of a chartered municipal government, the Mayor and corporation making up the civic body:

"Now let me add this word: Corporations, like many other institutions, like even Parliament itself, are on their trial in this and other countries. If you look at the United States you will see what is historically one of the alleged defects of democratic government—I hope only historically, I believe only historically—that is a tendency towards jobbery and corruption. It is not limited to legislatures and corporations. You have it in the States in insurance companies on a much larger scale. If the financier and capitalist talk about corporations, what may we say about insurance and other company capitalists in reference to their works? But still such things may be one of the temptations, and even the tendencies of corporate action, and why? Because corporate action is not the action of an individual who may be brought to book at once, but it is necessarily and wisely and properly spread over great areas of men, where even one individual can secretly do infinite damage to the institution he unworthily represents. Therefore, I appeal, not because I think the appeal is needed, but because this is a national danger, and we should place ourselves in both our individual and corporate capacities, beyond all possibility of suggestion of either connivance approval, or toleration of anything at variance with the most righteous, just, equal, and fair local government."

LETTERS TO THE EDITOR

Garbage Disposal

The Editor, MUNICIPAL JOURNAL AND ENGINEER:

Sir,—In his reply to my criticism on his paper on "Incineration of Municipal Waste," Mr. H. G. Bayles displays the same moral obliquity of vision that characterized his original paper.

He deals in insinuation rather than argument, in explanations that do not explain, and begs the questions at issue. When a failure is proven it is always some other party's fault. At Muncie, it was a "political issue that decided in advance to refuse acceptance of the incinerator." At New York, it was "certain features of design by the then manager" and "popular prejudice that acted through political channels and pre-determined the failure."

In this latter case, it is true the city suffered no loss except the time occupied by a futile experiment, but the company profited by the city's generosity because the city did not insist on the forfeiture of the company's bond for \$20,000.

This subject of municipal waste disposal is of very great interest and importance at many places now considering the question. Any public contribution to the discussion, to be of value, should treat it in a spirit of justice and fairness and not from the standpoint of a violent partisan posing as a disinterested observer, which is the attitude assumed in Mr. Bayles' paper.

Yours very truly, W. F. MORSE.

25 Broad street, New York City, Dec. 5, 1905.

The Management of Public Utilities

The Editor, MUNICIPAL JOURNAL AND ENGINEER:

You were good enough to publish, in your September issue, a plan proposed by me for the management of public utilities. This, as I therein stated, is applicable to any municipal undertaking but, for convenience of discussion, the matter was considered from the gasworks standpoint. The proposals made have been discussed and criticized in various publications since their appearance in your columns, and I will, with your permission, make further use of your space in order to re-state their merits as far as these appear to have been imperfectly understood.

The principal advantage of my plan is that it would take the gasworks out of politics—a thing that no other plan is capable of. There would be say, five, managing directors elected by those who pay the money and get the service; that is, those who have a financial interest, and their votes would not be killed by the votes of those who have no financial interest. The electorate for directors or managers could vote direct for them without any intervening machine or political organization, and they could cast their votes with the sole end in view that the gas works should be rightly managed. In electing a mayor or a city council this is absolutely impossible. There will always be important questions of saloon management, bridge building, street improvement, etc., which will necessarily control the vote of the electors without regard to

the gas management. The elector will control his vote by the question he thinks most important for the time being, and must, by the necessities of the case, let the gas management go. A voter cannot vote for one mayor or alderman who agrees with him on the gas question, another who is satisfactory on the bridge question, another on the water works question and another on the saloon question.

The directors being elected on special tickets would in no way owe their position to any political boss or officer, and therefore could neither be dictated to by any one nor, in turn, dictate to any one on political questions any more than (nor half as much as) the directors of a manufacturing establishment for pecuniary profit. The directors ought to be men of experienced and tried business ability. Their only duties would be to select engineers, managers, treasurers, etc. for the running of the works and, *as part of that duty*, see whether or not the active hired salaried officers exercised proper care, technical and business ability and integrity in running the business, and if they did not, to remove them and select and employ others who would. These salaried managing officers should have entire control, without interference by directors or others, over the subordinate laborers, clerks, etc., hired to do the work.

The elected directors would not need to give a great deal of their time to the undertaking. An average of two or three weeks, all told, in a year would be more than enough, but they ought to be abundantly paid for that, say ten or twenty dollars a day of eight hours, owing to the size of the works to be managed. I ought to emphasize the fact that the salaried hired officers would not feel compelled to give any attention to politics in order to keep their places, but could give their whole ability to giving the ratepayers the worth of their money; the consumers, being the payers, are the ultimate persons to be satisfied.

There would be no opportunity for graft. The operating concern not being in a position to make money for its officers or managers, and there being no stock on which dividends can be paid, there is no money with which to buy councilmen or mayors, or to corrupt voters. There would be no object in corrupting them, even if money were available, for any advantage given to the management would go back to the consumers who would, together, be a controlling power in the city, being a large proportion of the best citizens. Then, too, the managing corporation would not be a close corporation, for every man who had gas pipes put into his property and subscribed for gas would, by virtue of that fact, be a member of that corporation, and no one else would have any financial interest in the matter and could not be wronged by the misconduct of those in control.

Where the city does not own the works and cannot build or buy them because it has reached the limit of indebtedness, these might be built on a plan something like that adopted by Springfield, Ill., described in Prof. Bemis's work on "Municipal Monopolies," and paid for out of a special fund set aside for that purpose out of gas

rates. The managing company would be a tenant of the city; its duties and liabilities, the pay of its directors and the price at which the city itself should be supplied with gas would be defined in the lease, contract or franchise given the company by the mayor and council. There would be no inducement for corrupt boodlers to get control of the management, for there would be little opportunity for graft if they succeeded.

Whenever the lease to the managing company expired or was terminated by agreement or for breach of conditions the works and assets of the company would revert to the city with very little delay or complication.

The respective plans of municipal management and private ownership have an almost irresistible tendency to lead to corrupt practices. They are continually making dishonest city officers and corrupt managers of private companies out of honest men. The strain put upon them is usually too great for human nature to resist. Bribery or the corrupting use of patronage seem to be the almost indispensable price of success, under either plan. This could be avoided under the proposed plan, which is a combination of municipal ownership with the advantages of private management.

JAMES M. RICE.

Peoria, Ill., November 29, 1905.

QUERIES AND REPLIES

INQUIRIES of general interest, with such parts of our mailed replies as contain data possibly of service to others, are reproduced in this column, which is also open to those desiring to obtain information from readers.

Municipal Lighting Contracts

A city official would be obliged by information, through THE MUNICIPAL JOURNAL AND ENGINEER, as to the form and provisions of a contract for municipal lighting, to be entered into with a private company. This being a matter of considerable interest, we will summarize the principal data received.

Bill-Board Ordinances

A correspondent desires names of cities which have adopted bill-board ordinances. Although not so stated in the inquiry received, the principal stipulations should be given in any replies furnished.

Payment for Hydrants, etc.

A CITY clerk desires information as to representative schedules of payment, to a water company, for water used through hydrants and in public buildings, where the city bears the cost of installing the hydrants. Recent data on this point will be of interest to many readers.

Brick Paving

A CORRESPONDENT, referring to the article on Brick Paving on page 258 of our December issue, states that he is not sure that he understands "the method described for filling the joints with cement grout." His difficulty appears to be in the use of the word "pouring" in that connection, on which he asks whether "spouts or brooms" are used.

By "spouts" we presume he means pails with a tubular or funnel-shaped opening, such as are used for pouring

asphalt into joints. The article used the term "scoop shovels" and emphasized the necessity of "constant motion" to the success of the process. It also laid stress on the boxes in which the grout is mixed being so arranged that the work of pouring can be carried on across the whole width of the street. When it is remembered that the specific gravity of Portland cement is at least three times that of the water with which it is mixed, the importance of constant stirring and the avoidance of carrying or other delay, favorable to settlement, will be readily appreciated. This is, in fact, one of the most crucial operations of the entire work, and as the process—whether called "pouring" or by any other name—is lucidly described in Prof. Johnson's "Engineering Contracts and Specifications" we cannot do better than quote his remarks, which embody part of a standard specification used in the city of St. Louis: "The grout shall be mixed in portable boxes in the proportion of one part cement to one part sand. Not more than one ordinary water bucket full of cement with the same amount of fine sand shall be mixed at a time. The cement and sand to be thoroughly mixed dry until no streaks appear in the mixture, then sufficient water to be added to make the grout of proper fluidity, when properly stirred. The grout shall be transferred to the pavement in scoop shovels and rapidly swept into the joints by steel brooms. During this procedure the grout remaining in the box must be constantly stirred in order to prevent a separation of the sand from the cement. After the grouting of the pavement has been completed the newly finished work must be kept from traffic by putting up substantial blockades and, if deemed necessary, by watchmen stationed to protect the barricades. This blockade must be kept up for at least seven days after the grout is applied."

Convention Dates

January

NEW ENGLAND WATER WORKS ASSOCIATION, Annual Meeting, January 10.—Willard Kent, Secretary, Tremont Temple, Boston, Mass.

NATIONAL ASSOCIATION OF CEMENT USERS, Milwaukee, Wis., January 9-12.—Charles C. Brown, Secretary, 310 Commercial Club Buildings, Indianapolis, Ind.

February

NATIONAL BRICK MANUFACTURERS' ASSOCIATION and the AMERICAN CERAMIC SOCIETY, Philadelphia, Pa., February 5-17.—Theo. A. Randall, Secretary, Indianapolis, Ind.

March

ARRANGEMENTS are being made for holding the next annual convention of the NEW YORK AND CHICAGO ROAD ASSOCIATION in Hornellsville, N. Y., in March. Details will be announced later.

TACOMA, WASH., finds that the demand for civil engineers on railroad construction in that section calls for higher pay in its city staff if removals are to be avoided, and has acted in that spirit in at least one instance.

Personalities

MAYOR TOM L. JOHNSON, of Cleveland, Ohio, is the subject of a laudatory "characterization" in the December *Arena*, contributed by Edward W. Bemis, Ph.D., better known to our readers as the Superintendent of the Cleveland Waterworks.

MR. LE GRAND BROWN, of Rochester, N. Y., under whose engineering supervision important paving works have been completed at Batavia, at a cost of \$28,000, has had a large experience in this class of work, notably at Canandaigua, where \$375,000 was expended under his directions.

MESSRS. KEUFFEL & ESSER, the well-known manufacturers of mathematical and surveying instruments, were among the sufferers from an alarming fire at Hoboken, N. J., last month. The first reports led to the erroneous impression that their factory was destroyed, but we are asked to state that, as the main buildings were not damaged, no serious interruption of the firm's business is anticipated.

MR. C. G. MOTT, whose death, in England, was recently announced, may be regarded as having been, along with the late Mr. Greathead, the originator of the tube system of railways. It was mainly through his insistence that electricity was adopted in the pioneer line, constructed about fifteen years ago; he was Chairman of the City and South London Railway Company, which built the tube in question.

MR. CHARLES MULFORD ROBINSON, well known as the author of practically unique works on "The Improvement of Towns and Cities" and "Modern Civic Art," has been invited to report on the artistic development of Honolulu and will leave for that city during the present month. One of the more recent of Mr. Robinson's reports deals with a similar problem at Colorado Springs, which may be expected to develop on the lines laid down by Mr. Robinson in view of its exceptional requirements.

MAYOR E. F. DUNNE, of Chicago, whose efforts in behalf of municipal ownership of the street railways of that city have made his name widely known, writes to *The National Magazine* (Boston) as follows: "In addition to having an unfriendly council, I am further handicapped by the fact that every paper in the city except the Hearst papers are doing all they can to thwart municipal ownership, and all the banking interests and capitalists of the city seem to be in league to prevent the consummation of municipal ownership in this city."

POLICE COMMISSIONER McADOO, of New York, who may be regarded as an authority on the subject under discussion, made the following significant statement in connection with his expressed determination to retire from office: "My experience has led me to the conviction that a police administration, to be successful, must be absolutely free from partisan politics. The touch of politics poisons it at the root, and makes it instead of an instrument of public good a thing of evil and a source of danger. This, in my opinion, is not only good police policy, but it is good politics in the largest and best sense."

Public Lighting in Minneapolis

THE consideration of bids for public lighting in Minneapolis in 1906 has resulted in the Patterson Street Lighting Company of St. Paul and Minneapolis being awarded the contract for maintaining and lighting 5,500 incandescent gas lamps at \$12.25 per lamp. This is \$1.15 less than the 1905 price for similar service and fifty-nine cents below that for 1903, the first year of the company's service. The Minneapolis General Electric Company was awarded the contract for furnishing and maintaining 1,056 arc lamps at \$95 per lamp on an all-night schedule up to and including the last day of June, when a reduction of \$10 per lamp is to be effected. This is rendered practicable by the new power plant now nearing completion at the falls of the St. Croix river, sixty miles away.

In the absence of any competing bid, the Minneapolis Gas Company was awarded the contract for gas-lighting at ninety-four cents per thousand feet.

THE LONDON COUNTY COUNCIL, constituted in 1888 to take the place of the then existing system—or lack of it—controlling the administration of the English metropolis, has jurisdiction over an area of 117 square miles. The annual financial statement, laid before the Council on October 25th, shows an enormous increase in the responsibilities of the Council, and in the burdens imposed upon its constituents, this being especially true in regard to the debt. The Council took over a net obligation, in this respect, of \$87,500,000 and has increased it to \$222,500,000. In 1889-90 the annual expenditure was \$17,500,000, as compared with a present outlay of \$80,000,000.

A LARGE WATER CONNECTION, made under pressure, is noted in a recent issue of *The Journal of Gas Lighting and Water Supply*. It was desirable to insert the 16-inch connection without emptying a mile of the 42-inch main with which it was to be made, and a machine was employed in which the revolving cutter shaft works through a stuffing-box, thus preventing the outflow of water when the perforation is effected. The main was part of the metropolitan system controlled by the Water Board created in place of the former London companies, and the work was carried out "without reducing the pressure or interrupting the service in any way."

THE WASHINGTON AVENUE BRIDGE over the Mississippi River at Minneapolis is to be widened by the American Bridge Company, whose local representatives, Messrs. Bayne & Hewett, have been awarded the contract, the total amount being \$47,987. The work is to be completed May 1, and will involve a total expenditure of \$70,000.

TO REDUCE THE RISK OF FIRES from electric lights in buildings is the object of an ordinance recommended by the St. Paul Fire Board for passage by the city council. The ordinance provides that electric wires in churches, theatres and other public places shall be laid in metal conduits unless a different method of insulation is first approved by the city electrical inspector.

A PAVING DECISION

THE Appellate Court at Indianapolis, upon an application for rehearing, under its former decision by a divided Court that a patented pavement could not be laid, has unanimously reversed its former holding and expressly decided that a patented pavement can be laid, under conditions providing for competition. The Court further held that the terms providing for competition under which the proposed contract was let did not provide such competition as the law requires, and that the owners of the patents had reserved the right, in their proposition to the city, to determine whether or not the successful bidder had provided himself with such machinery and appliances as would enable him to successfully lay the pavement under the plans and specifications adopted, and upon this ground alone sustained its previous action in holding the proposed contract illegal.

It is understood that Warren Brothers Company, the owners of the patents for laying the Bitulithic pavement, have filed with the city authorities another proposition, giving the city the right to lay the Bitulithic pavement without any reservation, and to enter into a contract, with any contractor to whom a contract may be awarded at any time during the years 1905-6, upon the payment to Warren Brothers Company of a fixed sum per square yard for each yard of pavement laid, and that this price shall be the same to all bidders.

In reaching the conclusion arrived at, the Court cites with approval the case of *Hastings vs. the city of Colum-*

bus—42 Ohio, page 585, where such a proposition was made to the city and upheld by the Supreme Court of that State.

In view of the fact that the street was already torn up, the property owners were anxious that the work should be proceeded with, and as the contractor had already expended a considerable sum of money, an agreement was reached whereby the contractor was to finish the work and practically all of the property owners waived any objections as to the regularity of the proceedings, more than half of them having originally petitioned for the Bitulithic pavement to be laid.

It is generally understood that the pending litigation was instituted by the Asphalt Trust and is being prosecuted in their interest. The case will no doubt be appealed to the Supreme Court of the State for final determination of the several questions involved.

It is understood that Warren Brothers Company will now file with other cities in the State, where propositions are pending for laying the Bitulithic pavement, a proposition similar to the one to be filed with the city of Indianapolis, to conform to the requirements of the present decision of the Appellate Court, holding that a patented pavement can be laid under such conditions as afford a fair and reasonable opportunity for competition, which proposition will place all bidders upon an equality by giving them an opportunity to purchase the patented article or process at its value.

Firemen Fight Chemicals

The Fireman (London, November) describes an exciting scene in that city on September 26, when an employee of a firm of chemical manufacturers accidentally upset a carboy of acid on one of the landings in a building. "Instantly the whole building was permeated with fumes so overpowering that the employees of other firms on the upper floors were unable to descend. The fire alarm was rung, and the Fire Brigade attended. The escape was immediately raised on the top floor, and three men were brought down in a state of collapse. The firemen who first entered the building were also overcome, and eight of them besides the men rescued had to obtain hospital treatment. The firemen's [polished brass] helmets were tarnished a dark brown color, and the faces of the men testified to the experience they had gone through. The amount of the liquid spilled was very small, nothing more than a large tea-cup full, but the scene that followed was remarkable. Little puffs of smoke hung underneath the banisters of the stairs as though from hundreds of little fires. In about a quarter of an hour the fumes died down, and the firemen could enter the building with ease. It is said the fumes could be detected many hundreds of yards away from the place."

A Municipal Labor Agency

LABOR COMMISSIONER A. H. GROUT, who has directed Seattle's Department of Free Help since its inception in 1894, has compiled an interesting and exhaustive report, showing that this municipal agency has met with marked success and cordial support among the working classes, including the labor union element. From fifteen to twenty private agencies, each paying a license fee of \$100 per annum, apparently interfere but little with the work of the Department, which is maintained at an average annual cost of \$1,300, exclusive of items for rent, telephone, fuel, etc.

The Commissioner's report, illustrating the urgent need of many seeking employment, cites facts and figures showing that in the year 1903 there was a total estimated saving of \$36,366 to the people through the operation of the municipal agency. This conclusion is reached by a comparison of the charges of various private agencies for rendering assistance, averaging \$1.25 for each person, with the actual cost of maintaining the city's help bureau, the latter being placed at about five cents for every person applying for assistance. A total saving of more than \$250,000 in this way is shown during the agency's existence.

AMERICAN PERIODICALS REVIEWED

Sewer Contractors as Engineers

The Engineering Record (New York, November 25) comments upon the advertisement issued by a small borough in Pennsylvania, in which not only bids but plans for a separate system of sewers, with disposal plant, are called for. After remarking that "responsible contractors have enough to look after in the execution of their legitimate work," the article proceeds: "The design of municipal works has become a specialty, and the men who are giving their time to it are professional men, obliged to keep in touch with progress in many fields of applied science, just as the lawyer must always read law and the physician must always follow the voluminous literature of the medical profession. It is the engineer's province to tell his clients what they should do, but his responsibilities cease there unless he is retained to see that his advice is followed. The contractor's responsibilities are entirely different. He has to direct the men engaged on construction, to supply the plant necessary for their use and to furnish the materials for construction which are not supplied to him by the owner. In order to be successful he generally puts the work under competent foremen, trained by long experience with his methods, the more expensive parts of his plant are transferred from other works he is carrying on, and the whole undertaking is organized along lines he has found to be successful in such work. This is the practical, executive side of the undertaking, just as responsible and important as the professional part attended to by the engineer but wholly different in character. By adopting this system of divided responsibility the city is able to get the best work at the lowest cost, there is a minimum duplication of work in letting the contract, and both the city and the contractor have in the engineer a fair and impartial judge of the obligations of the two parties to the contract."

A Civil Service Anomaly

The American Journal of Sociology (Chicago, November) contains a lengthy article, by Clinton Rogers Woodruff, of Philadelphia, dealing with the Municipal League which carried on an important work in that city for thirteen years, ceasing only, in the autumn of 1904, when it was decided "that the work in which it had been so long engaged should be carried on by new men with enlarged resources." The following paragraph is typical of the scope and spirit of this exceptionally valuable article: "Through its control of the patronage, and the opportunity thereby afforded to assess public employees for political purposes, the "machine" has been able to maintain its power in State and municipal affairs. If a permanently improved municipal government is to be secured, we must remove city employees from politics. They must be appointed only on the basis of their merit and fitness, and continued in office free from political exactions and dominations, and for so long a period as they discharge

their duties faithfully and satisfactorily. The Bullitt Bill intended to place our municipal service on a merit basis; but, because of the provision giving to the heads of the departments, who were themselves the appointing power, the authority to draft the rules and regulations governing appointments, it has failed of its object, and has resulted only in keeping the very worst and most inefficient out of office. There is no more vicious principle in administrative law than that which places in the hands of appointing officers the ability to formulate the rules in accordance with which they are to make appointments. Experience has time and again demonstrated that they will be unable to resist the demands for office on the part of interested politicians and office-seekers, and that they will therefore make the requirements as meager as possible. President Proctor, of the United States Civil Service Commission, testified before the Senate Investigation Committee that such provisions were practically worthless."

Engineering Precedents

The Engineering Record (New York, November 25) in an article on this subject, points out that "an engineer possessing an aggressive professional temperament and fertility of resources must frequently strike a judicious balance between novel procedures and engineering precedent. . . . It is beyond all question that the judgment of the engineer must be his guide as to the adoption of new materials and procedures in violation of precedent, but there are certain general principles involved which should be respected and do not trench upon the proper use of precedent nor stand in the way of progress. It is obvious that experimenting by a young engineer, for instance, whose judgment has not been trained by experience is likely to bring financial loss to his client and prejudice to his professional standing. The young practitioner may, to a greater extent than the older member of the profession, follow somewhat along the lines of his legal friend. Accomplished work may suitably be a guide. In fact, experimenting in practical work, except when directed in general by engineers of educational training and experience, is apt to be hazardous. On the other hand, that kind of violation of precedent which follows from rational professional development, to the extent of displacing familiar methods or materials, is not only justifiable but highly desirable. It is only through such rational and well directed development, based sometimes largely upon full-scale experimenting, that the best and most healthful engineering advances are made. Any engineer who declines to use such a well tried material as concrete and involves his client in large additional and unnecessary expense in consequence of simple professional inertia is falling far short of serving his client with the efficiency and excellence that ought to characterize a high grade of engineering work."

Telephone Service

Engineering News, of October 12, commenting upon "the apparently excellent bargain" which the British Post Office has concluded with the National Telephone Company, ascribes this "to the fact that it retained to itself from the outset the control of the whole telephone situation, first by limiting the main license of the Company to twenty-five years and second by building and operating trunk lines itself." On the subject of competition and its alleged advantages, the *News* delivers itself as follows: "Whatever opinion one may hold regarding the relative advantages of public and private ownership of telephones it is obvious that the best service demands a single highly centralized system, rigidly controlled by the public, in the matter of service rendered and rates charged. Attempts at telephone competition might possibly be warranted in municipalities which had foolishly neglected to retain control, and in which honest and intelligent efforts to secure a readjustment of rates and an improvement in service had met with no response from the existing companies. But even under such circumstances the benefits of competition are liable to be more apparent than real. A new company might compel an old one to reduce its rates by one-half, but it can rarely if ever drive an old company out of business; failing in this it becomes necessary for those who wish a comprehensive telephone service to provide themselves with two telephones. This generally means higher total charges than were paid before to the old company, and in addition the great nuisance of two telephones. The streets are also needlessly encumbered, above or beneath, with the duplicate line system, and altogether there is a waste of good money on the part of the competing telephone companies and a loss of money and time on the part of the telephone subscribers."

In the absence of any prospect of America emulating the British Post Office in the assumption of ownership, and looking toward the inevitable unification of the service, "there is all the greater reason for public control in America than there was in Great Britain when it granted its twenty-five-year license in 1886. How this control is to be achieved under our complex conditions of National, State and municipal government we are not prepared to say. The problem should be faced at once by at least the State and local governments. The fetish of competition should be abandoned once for all, in this and many other branches of the public service, and in its place a strong, competent and honest public regulation of a recognized natural monopoly should be established."

The Rules of the Road

The Street Railway Journal (New York, October 28) urges that the rules of the road under which traffic has hitherto been conducted have outlived their usefulness. "They were not devised for vehicles running thirty or forty miles an hour and built with a ram bow at that. . . . We willingly recognize the fact that the automobile is a useful machine and that it has become a permanent part of the world's vehicular outfit. We have no quarrel with it as such. Nevertheless, we think it is time

for such a revision of the rules of the road as shall give it equal and not exclusive or exaggerated privileges. . . . The abuses of automobile speeding cannot be corrected by any definite number of sleuths with stop watches. But rules of the road can be established that with malice toward none will fix the responsibility of speeding, with penalties that will make even a drunken driver think twice before he takes chances. The street railways of the country carry and will continue to carry the vast majority of all who travel by means other than those furnished by Nature. Quite apart from the rights of pedestrians, those who are passengers in street cars have the right to enter and to use these cars in safety. The street railways in carrying passengers have to assume a responsibility for their safety almost equivalent to insurance, and the railways therefore may properly demand such regulation of traffic as shall enable them with reasonable precautions to carry out their trust. The rules of the road are an inheritance from days when electric cars and automobiles were undreamed of. The times have changed and the rules should change with them. The street railways do not ask for unreasonable favors, but considering their enormous passenger traffic, they may properly ask such regulation of other traffic as shall remove what has now become a serious additional peril to street traffic."

Sculpture in Cities

The Architectural Record (New York, December) thinks that "the passing of the eagerness to put sculpture in the parks, if it may be said to have really passed, means no lessening of its prominence in cities. Indeed, that must be expected to increase as the new ideal of civic splendor strengthens its hold on our American imagination. And what a nationally typical beneficence, by the way, was that contained in the will of that Chicago lumberman, lately deceased, who left \$1,000,000, of which the income is to be used for 'the erection and maintenance of statues and monuments in the public places, in the parks, and along the boulevards' of Chicago. . . . One would probably search in vain other times and other lands for a like order for municipal sculpture. But if the gift is familiar in its character, its exact purpose is novel with us. It comes, however, at a time when such significance as it has is increased by a number of instances suggesting that sculpture will play a more conspicuous part in the adornment of our cities than it has done in the past. Even in New York the new statue of Sherman is ranked with the great sculpture of the world. It is easier, however, to get public statues than to get rid of them, and in our American life—which seems all the briefer for its rush—*ars* still is *longa*. One trembles a little to think what the tendency may bring us to; but along with the bad art, good is to be expected. True art as well as spurious flourishes under financial encouragement, and if wisely administered such a sum as that left by the lumberman for the encouragement of civic sculpture may do much. He wisely made the Art Institute his trustee."

Forestry in Massachusetts

The Outlook (New York, December 9) states that under the operations of the law recently passed by the Massachusetts Legislature, that State is now giving practical aid to the owners of woodlands—a work which deserves imitation in other States. "The aid consists of lectures by the State Forester or his assistants in various parts of the Commonwealth, the publication of bulletins and circulars for free distribution, and, finally, actual demonstrative work in the field. Since last January the State Forester and his chief assistant have traveled over ten thousand miles on work connected with their offices. Requests for aid from all parts of the State are now coming to them so rapidly that it is impossible fully to satisfy the demand. In the selection of plants the State not only helps but even provides some plants at nominal cost. The chief species grown at the State Forestry Nursery is white pine; the others being spruce, white, red, and swamp oak, hickory, chestnut, ash, maple, whitewood and birch. From this nursery seedlings are distributed on condition that the applicant shall operate under a plan approved by the State Forester; of course the purpose of the Forester is to have these seedlings go to genuine landowners for permanent planting, and not to any one likely to resell them in a few years. If the aid of the Massachusetts Forestry Service is not given indiscriminately to any and all applicants, neither is it entirely free to the landowner. The cost is nominal, however, covering only the traveling and subsistence expenses of the State Forester and his assistants."

City Planning in Toronto

The Architectural Record (New York, November) refers to the task undertaken by the Ontario Association of Architects in the proposed preparation of a comprehensive plan for the development of that city, special attention being directed to what the *Record* believes to be the "entirely novel and original lines" which are being followed: "At the last annual meeting a great deal of emphasis was placed upon civic improvement, with the practical purpose of obtaining a share of it for Toronto. The importance was recognized of securing a report that should offer an ideal, a picture of what Toronto ought to be and might be, toward the realization of which every future step should count; and a committee was appointed to arrange for this. The members of the committee, after consultation, decided that local conditions were such that the architects themselves would have to take a large part in directing whatever plans were approved, and it decided to recommend the appointment of one of the Association's own men. The member selected was a Beaux Arts man, who has had considerable experience in large projects, and a committee meets him once a week to discuss his suggestions, approving, changing them, or turning them down, as the majority decides. Practical engineers and street railway men are also called in, to advise in engineering and transportation questions, as they would be by the ordinary expert. There is thus being

evolved a plan which it is hoped will give general satisfaction, and which it will not be easy to criticize with entire impunity. That, at least, is the theory. How it pans out remains to be seen, and promises an interesting and instructive spectacle. The man who is doing the planning, however patient, must have—one would think—an uncomfortable task with every tentative detail held up to critical discussion, and his undertaking the pleasing of a majority. To choose an expert in whom there is confidence and await his fully matured and completed plan, would seem the easier as well as the wiser course. However, since there is willingness in Toronto to try the experiment, the outcome may be awaited with interest."

The Power of the Boss

Public Opinion (New York, November 25) takes a far from optimistic view of the recent overturn of the bosses. "The boss is dead. Long live the boss. That may be the way in which we shall read the history of the last campaign after two or three years have elapsed. Murphy has received his death blow. Durham, of Philadelphia, is down and out. Cox, of Cincinnati, has laid down the scepter. But all this has happened many times before. The truth is that the battle against the boss has only just begun. These particular individuals have been rebuked, but the principle, and there is a principle of bossism as well as a principle of reform, still exists. Public sentiment is spasmodic, violent when aroused, but subject to long periods of lethargy. Another factor in the case is that of the efficiency or otherwise of the reform governments. Unless the men who have beaten the bosses fully demonstrate their right to rule they will give place to machine government again at the next election. It is almost a truism in American politics that reform seldom succeeds itself. One explanation of that is that reformers consider their work done when the election is over. The final test is their ability to give better government than did the bosses."

The Future of Engineering

The Clarkson Bulletin (Potsdam, N. Y., October) contains, among other contributions to this organ of the Clarkson Memorial School of Technology, an article on "The Engineer in Manufacturing Industries," by Walter S. Graffam, B. S., from which we extract the closing paragraphs:

"Many are saying, as of the older professions, that that of engineering is becoming crowded, notwithstanding the fact that every day witnesses an enlarging field for its work. New materials, processes and methods demand new men. There is scarcely an article of useful manufacture which does not have its origin and development in such relation to the engineer's work that without him it would not have been or it would cease to be. He is ever moulding and shaping things to useful purposes. In view of this fact it does not seem plausible to say that the young men of to-day will not find the opportunities awaiting

them which the past generation enjoyed. They may not find the same opportunities; but, it is the privilege of the engineer to make opportunities. The supply of educated and trained engineers, of competent thinking men, capable of forming the strong advance guard of the profession, is not yet; nor is it ever likely to be equal to the demand. Those who enter this field with the determination to succeed, cannot be disappointed unless that determination is allowed to sag.

"The almost invariable consequences of engineering training—thoroughness, command of details, observation and the comparing of observations, appreciation of the value of continuous records, courage and ability to grapple with new conditions, faculty of organization, the concept of the fundamental importance of efficiency—these are more and more demanded of the manager of the great undertakings which characterize modern material civilization."

The Richmond Gas Works

The Arena (Boston, December), referring to the profitable operation of the Richmond, Va., gasworks under municipal auspices, as noted on page 177 of *THE MUNICIPAL JOURNAL AND ENGINEER* for September last, observes in it "another illustration of the wisdom and practicability of the people owning and operating their own utilities. . . . The municipal plant was established in 1867. During the generation that elapsed from 1867 to 1897 the operation shows an actual surplus of \$1,532,930 to the credit of the people. If it had been in the hands of a private corporation such as have exploited the people of New York, Boston and other American municipalities, the people would have paid extortionate prices for their gas, with the result that besides having been robbed for an inferior commodity, the city would have received no returns, while a few men would have acquired millions of dollars, a small portion of which would in all probability have been used to subsidize a corrupt political machine and to influence the press to discourse on the blessings of private-ownership and the perils of a city enriching itself by the legitimate fruits of its enormously valuable public franchises."

Economy in Road Construction

Engineering World (Chicago, December) contains an article on "Macadam Roads and Streets," by Halbert P. Gillette, M. Amer. Soc. C.E., in which the following appears: "Any young engineer who gives the matter of pavements and roads his careful study for a year or more, visiting the best examples of economic construction in this country, will be qualified to go into almost any small city and effect a revolution in pavement construction, if given an opportunity. Such a young engineer must bear in mind, however, that in the design of an economic street or road, the money available must be made to build as many miles as possible. To do this it is necessary to cut down the width of the pavement to a minimum, and to reduce the thickness of the pavement

to the least number of inches consistent with supporting the heaviest loads that will come upon it. We have just stated how the width of a pavement in village and city streets may be reduced to 16 feet, and at the same time give a satisfactory street if properly designed. In like manner, the paved width of country roads can be reduced far below what is customary. At present the standard width of a macadam road is 16 feet, but there are very many roads where the traffic is so light that 16 feet of width is extravagance."

What the Nation Lacks

Public Policy (Chicago, December 2) quotes Lord Rosebery's recent saying that the lesson that Japan has taught to the world is efficiency in administration. "The great defect of England, he declares, is national inefficiency, and this fact will threaten her commercial and political supremacy unless something is done to put an end to it." The comment proceeds: "The national defect of the United States is not inefficiency. Our industrial expertness is marvelous and our skill in organization is unsurpassed. What we lack is honesty. It is well to face the ugly fact squarely in the face, that the prevalence of graft in the political and business systems of the United States is the one glaring evil of this country. The reassuring thing is that the fact is being faced squarely."

The Sewage of Chicago

Engineering News (New York, November 9) states in an article dealing with the progress made in turning Chicago's sewage away from Lake Michigan, that the city will soon have spent \$70,000,000 in separating its sewage from its water supply, and concludes as follows: "It will still be drinking unpurified water, and it will still be sending its untreated but highly diluted sewage to the ocean by the long route of the drainage canal, Des Moines, Illinois and Mississippi rivers. Could it have done better, either in point of cost or of sanitary protection of its own citizens and those of other municipalities? It would be presumptuous for us to attempt to answer so broad a question at the conclusion of this review of the cost of the drainage canal and allied works, particularly in view of the fact that numerous of the foremost hydraulic and sanitary engineers of the country have advised Chicago to do substantially what it has done. Moreover, both the pros and cons of the drainage canal have been discussed voluminously by numerous experts in the St. Louis suit against the drainage canal. Some day the U. S. Courts will have digested the evidence and then we may expect a decision on the relation of the drainage canal to the water supply of St. Louis. Sanitarily, Chicago has received vast benefits from the separation thus far made of its water supply and sewage. If it can gain proportionate benefit by continuing the expenditure in the interests of a pure water supply it should not stop short of at least \$100,000,000."

FOREIGN PERIODICALS REVIEWED

Supply and Demand

The Engineer (London, November 24) directs attention to the conditions resulting from the over-supply of highly trained engineering assistants in Germany, pointing out that, as shown in a paper read before the Karlsruhe branch of the German Society of Engineers, "the relations between employers and their technical assistants are accompanied with considerable friction. The latter class, while generally equal in social position to the former, is, through economic and other causes, being gradually reduced to a condition of economic inferiority comparable with that of the classes dependent upon manual labor, the attainment of an independent position, owing to the crushing competition of the large producers, becoming practically impossible, so that the army of technicians, engineers, architects and chemists have, for the most part, the prospect of remaining weekly wage earners for life."

Over-production is assigned as the main cause of this condition. "In 1890-91 the total number of students in the technical high schools was 5,432, but in 1904-5 it has increased to 15,866. The natural science faculties of the universities, which had 1,100 students in 1891-2, have now 3,015, and the building trade schools, which had 4,251 in 1903, had 5,077 in 1904. The special schools for metal workers in Prussia gave instruction to 755 pupils in 1891 and to 3,011 in 1903, while in the kingdom of Saxony the corresponding figures for the technical institutes were 524 in 1884 and 2,687 in 1902." After contrasting the position of the trained technician with that of the workman, to the disadvantage of the former, the article concludes with these reflections: "Over-production of any kind is accompanied by its proper evils—evils which tend to correct a wrong state of affairs. The over-production of the technical man in Germany has made him apparently such a drug upon the market that he is no longer valued, and in consequence suffers all sorts of unpleasantnesses and disabilities. From these he will try to free himself by the power of unaided effort, but the only cure is the eradication of the cause; over-production must be arrested."

American Earnestness

The Engineering Times (London, November 30) publishes an article on "American Universities," by Principal R. H. Reichel, in which he dwells upon the fact that "the total amount of private benefactions to university education in the States during the last thirty years reaches the amazing figure of forty millions sterling," this being quite apart from the large annual appropriations made by the Federal and State Governments for technical colleges and State universities. As contrasted with this, the Author has to record the fact that "the total amount contributed by private benefactions in the same period in these islands was about five millions." Special attention is directed to the frequency with which students accept all

sorts of vacation work—much of which would be considered degrading in England—in order to meet the expenses of tuition. Commenting on the statements made, the Editor writes: "The close connection between theory and practice, which is such a feature of American education, is being watched with great interest on this side of the Atlantic. The remarks of Principal Reichel are well worthy of our attention, when all the vigorous provincial universities in Great Britain are seeking to obtain money for educating the future leaders of our industrial undertakings. The vacation work of the students in America proves that they are in earnest."

"Advocates of Municipal Ownership"

The Canadian Municipal Journal (Montreal, November) mentions the street railway conditions in Toronto, which were the subject of an able address by Mr. Francis S. Spence, Member of the Board of Control of that city, reproduced in our issue of October last. Our Canadian contemporary says: "Toronto citizens are being driven into a municipal street railway by the 'cussedness' of the Toronto Street Railway Co. The company absolutely refuses to carry out the orders of the City Council, although bound by contract to do so. And yet the contract is considered a good one. The best advocates of municipal ownership are not the advanced students of civics, but the monopolies which will not give what they promised when they got the franchise."

Small-Pox Hospitals

The Sanitary Record (London, November 16) notes that the Glasgow authorities are in trouble over the design of a small-pox hospital, for which the original plans—with wooden buildings—showed a cost of \$1,000 per bed. Amended plans, principally aiming at the elimination of the fire risk, brought the cost up to \$2,100 per bed. As regards the walls, it was found that the difference of cost between a thin brick wall and the wooden walls would be more than met by the increased insurance and increased depreciation that would be required for a wooden building. . . . One question strikes one forcibly about such a proposal as this. If small-pox is to be permanently with us, by all means let a hospital of a permanent character be constructed. But if, as we all hope, small-pox is destined to be stamped out and become a thing of the past, then the true policy would be to erect premises of a merely temporary character on much more economical lines. Which should be the sound policy? The optimist will say the latter. That, no doubt, was the original intention of the Health Committee, but apparently they are swinging round to something entirely different. The institution the plans of which they are at present considering will, when finished on the lines indicated, cost the princely sum of \$760,000."

School Hygiene

The Journal of the Royal Sanitary Institute (London, December) contains a paper on "School Hygiene," read before the Interstate Medical Congress of Australia by Dr. J. S. C. Elkington, Chief Health Officer for Tasmania. Maintaining that "the greatest of the faults committed in the name of education in the past has been the non-recognition of the physical side," he writes thus: "School is not merely a preparation for life, but an important part of life itself, wherein body and mind are alike plastic and capable of almost infinite development for good or ill. In the German Imperial Health Manual a great truth is summed up in a pithy sentence: 'The sense of justice demands that in a State where attendance at school is compulsory, the children shall be exposed as little as possible to dangers of health while in school.' Far-reaching as is this principle, I submit, however, that a sense of justice demands more than this. It requires the practical recognition of the fact that not only shall children be protected from the many physical risks induced by the entirely artificial process to which compulsory education submits them, but that they shall be practically and intelligently instructed in the few simple rules by which they may carry the process of protection on to their after life. It requires, further, that justice shall be done to the taxpayer in that the immense amount of money which he contributes for the purpose of compulsory education shall be expended to the best purpose, in that by sensible instruction and care at school there shall be saved a proportion of the further sum which he contributes for the treatment of unnecessary preventable disease, and in that large sums will not continue to be wasted in attempting to force symbolic information through eyes that cannot see correctly, and ears that cannot hear properly, in order to reach brains somnolent and unresponsive through poisoning by vitiated atmosphere."

Rural Housing in England

The Justice of the Peace (London), in a recent issue, discusses the growing need of better housing accommodations for the English working classes. In the following paragraph special attention is directed to that phase of the problem which has been intensified, as many believe, by the excessive demands of sanitarians, with scant attention to its economic aspects. "In rural districts and in semi-urban districts the housing question is largely one of cost. The troubles we have had over by-laws have simply been due to the fact that authorities have adopted by-laws, the requirements of which have been largely in excess of the necessities of the case. The result has been that, instead of having cottages which would have been good enough for the purpose, they have had no cottages at all. We are not saying that by-laws are not necessary. We are told that healthy houses can be built cheaply, and that by-laws can be made which will insure healthy homes without unduly adding to the expense. We are told that the problem of the moment is a cheap

cottage, but we think it is a branch of that problem to determine the minimum requirements necessary to make such a cottage reasonably habitable. That is a problem to which our sanitary experts might very well give their attention. So far, their object has been to get as much done as possible. In many districts the inertia of the farmer has been too much for them, and in cases where the medical officer has no fixity of tenure he has either been dismissed if he has been too zealous or he has had to be content to see his representations laid on one side."

Hamburg's Water Supply

Gesundheits-Ingenieur (Munich, November 10) analyzes the report of the Hamburg Water Department for the year 1904, showing an increase of 4 per cent. in the consumption of water over the previous year. Of the total volume supplied, 37.28 per cent was delivered through meters, of which there are 17,250 in use. The average daily consumption per head amounted to forty-three gallons—a slight increase as compared with 1903. Taking into account the 179 cleansings of filters during the year, affecting an aggregate of 338 acres, the records show for the year a delivery of 27½ million gallons to each acre of filter. The sand renewals, applying to 1.89 acres, showed an average sand replacement of 12½ inches in depth. Bacteriological examinations, constantly maintained, showed an average of forty-four tests per day,

The Use of Water

The Builder (London, November 11), commenting upon a letter in its correspondence columns, urging alleged dangers to health from the quality of London's water supply, expresses the belief that "the complaints as to the quality of the water supplied to London are exaggerated. What is more serious, to our thinking, is the deficiency in quantity, the quantity per head of population estimated as necessary by most water engineers being most inadequate, and based on the calculations of a period when the domestic bath was a weekly instead of a daily function. It is now (rightly) considered necessary to provide bath-rooms in a class of house in which thirty years ago such a luxury (or necessity?) would have been considered out of the question; and as habits of copious ablution grow the demand for a larger supply of water will increase proportionately." The issue of November 18 contains a letter from another correspondent, drawing attention to the more liberal use of water in America, on which the Editor remarks that "in England we are hampered by the restricted and antediluvian ideas of water engineers whose sole idea of water supply seems to be to find out to how small a supply a population can be screwed down." These opinions should interest those who have observed, with mixed feelings, the complacent assumption, on the part of English authorities, that the entire difference between English and American rates of water consumption is accounted for by "waste" in American cities.

Street Watering by Trolley Cars

THE October-December issue of *Public Works* (London) contains the following among its brief notes on work in progress or projected: "For a long time Milan has been credited with the most perfect net-work of tramways in Europe, and has derived an excellent profit therefrom. The whole service belongs to the city itself, but is run by a company. Recently the enterprising Italian town has led the way in Europe by being the first to use electric tramcars for watering the streets. Reservoirs, adapted to the platforms, are emptied as the car runs by means of perforated tubes placed fan-shape at the back and front of the car, turning obliquely on each side towards the right and towards the left. At the front and back of the car there is a space left for those employed on the tram service, and when the car starts these men can regulate the distribution of the water according to the requirement and width of the street. With these cars the watering can be done in an hour, and in this city of 600,000 inhabitants the work is all finished before five o'clock in the morning, so as not to interfere with the regular tram service."

An English Opinion

The Sanitary Record (London, November 16) writes in commendatory terms of the annual report, by Mr. C. H. Rust, City Engineer of Toronto, on the engineering work of that city in 1904—a volume referred to at length in the November issue of THE MUNICIPAL JOURNAL AND ENGINEER. "It is," the *Record* observes, "like all his former issues, a model of what a Surveyor's report should be, and is as perfect a record of all the work carried out by a municipality as can be found. Municipalities in the United States and in Canada are greatly ahead of English municipalities in the compilation of statistical information relative to the works carried out by their engineering staffs, and provide clerical assistance for the work. Without such a staff it is patent the Corporation of Toronto could not be furnished with such admirable reports as those prepared by Mr. Rust, but the value of them must be immeasurable. The report abounds with tables, schedules, and diagrams, and it also contains a number of plans and photos. It is to be wished that most of the municipal engineers in England could have the privilege of perusing the publication."

Steel Construction in England

The Times (London) *Engineering Supplement*, referring to Mr. B. H. Thwaite's article on "Steel Frame Building Construction," in the July-September number of *Public Works*, deals editorially, as follows, with the Author's argument in favor of greater latitude in English regulations governing the erection of buildings: "How far Mr. B. H. Thwaite may have been helped in the discovery of these unsuspected beauties in American architecture by the fact that they are due mainly to the employment of steel is a matter of mere surmise. The author

certainly puts in a strongly-worded, and on the whole a convincing, plea for the greater utilization of steel for buildings in this country. Steel frame buildings are admittedly less costly, and can be erected more rapidly, than any other type of permanent building. The chief obstacle to the extension of this style of architecture in London would appear to be the interpretation by the London County Council of the Building Acts, the provisions of which, as construed by the officers of the Council, are hostile to the execution of steel frame buildings in that form which permits free play to their most advantageous characteristics. It is supposed that some relaxation of the rules in respect of the use of steel may be forthcoming in due time; and this, it may be surmised, will be welcomed by Mr. B. H. Thwaite and those interested in the production of steel in this country."

Isolation Hospitals

Public Health (London, December) reproduces an address by C. H. W. Parkinson, M. R. C. S., on "Public Health in Relation to the Public," mostly referring to English conditions. The following paragraph, however, touches on a point which is of more than local significance and is likely to be discussed with increasing frequency in this and other countries in which the value of expensive permanent hospitals for dealing with ephemeral outbreaks of disease is no longer so readily conceded as of yore:

"In our efforts to stamp out diseases we must induce the authorities to assist by providing large sums, either from public or private funds, to build and provide for the necessary institutions, but we should be careful that these sums are not wasted, and that there be no extravagance, and quite sure of the necessity for the same. When it was decided that the only method of stamping out infectious diseases was to provide hospitals for the isolation of the sufferers at once, we saw a demand for costly buildings, and in every little urban and rural district pressure was exerted to induce the authorities to provide hospital accommodation, and money was spent for the building and up-keep of a palace to be used for a case or two of scarlatina or diphtheria per annum. After an enormous expenditure doubts began to arise as to the benefits derived from these hospitals. Return cases were frequent, and it often happened that patients going to hospital with a mild attack of one disease contracted there another, which proved fatal. It was also clear that the term "Isolation" Hospital was a misnomer, and there was very little isolation to be obtained in the large wards; men began to doubt whether there was any diminution in the total number of cases in a locality where removal to hospital was practised, as compared with a district where this was not done, and whether the type of disease was not more severe in isolation hospitals."

MONTREAL, CAN., is preparing to remove snow from sidewalks by direct city labor, the objections to contract work being such as to justify this step.

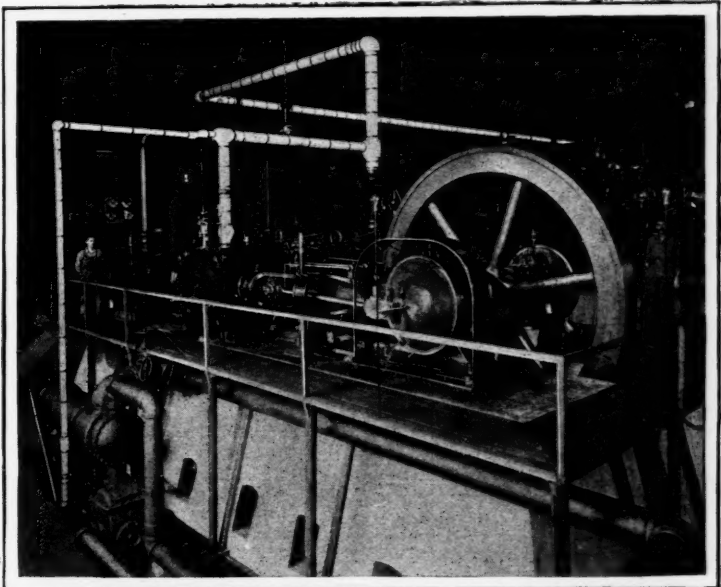
The Growth of Taxation

THE Duke of Northumberland, as Chairman of the Northumberland County Council, recently inaugurated an Infectious Diseases Hospital, built under the auspices of that body, and took occasion to make some observations in regard to public expenditure which are capable of a more extended application than that immediately in view. Speaking more particularly as to the necessity for institutions of the character then opened, he said that he was one of those old-fashioned people who believe that if the population were thoroughly vaccinated and re-vaccinated, no smallpox hospitals would be required. "That," he went on to say, "has been the experience of Germany, and there is no reason why our experience in England should not be the same. Therefore, I look upon a smallpox hospital as more or less of an extravagance; one, we must admit, that is absolutely necessary until we can persuade the population of this country to adopt the proper means for practically doing away with smallpox altogether. But, as it is within the power of medicine to do that, I hope the day may come when we shall look back upon smallpox hospitals as very antiquated and inefficient expedients. This, however, will not be the case with the ordinary infectious hospitals. We shall from time to time be exposed to epidemics, and must face them. We may hope that institutions of this description will hinder the spread of epidemics, but particularly that they will prevent infectious diseases, especially scarlet fever, being what they too often are now, endemic and constantly present in our midst. Their influence, combined with other sanitary measures, may also arrest the spread of typhoid fever, which is, or ought to be, an entirely preventable disease. . . . "I do not know whether or not you wish me to take this opportunity of saying anything in defence of the body over which I have the honor to preside. If I do I should say this: That so far as my experience goes, all representative institutions are very feeble instruments for promoting thrift. From the House of Commons down to the Parish Council, they are all expensive luxuries. They may have many merits, but they have not that of being in their nature economical, because you have a large number of people who represent a still large number of people, all of whom think, very rightly and properly, that they ought to be fully informed upon the business transacted by their representatives. This leads to a great deal of printing, tabulating, and clerical work, all entailing expense. This is a new burden, imposed upon the country within the last twenty years. In addition, one of the effects of representative institutions like county councils is that there is a constant temptation to Parliament to get over the difficulties of settling the details of measures and the machinery by which those measures should be carried out, by transferring that duty to local authorities. The consequence is that, year after year, more and more business is imposed on these authorities, entailing increased expenditure."

NEW YORK CITY retires the members of its Fire Department on half-pay after twenty years' service.

The Air Lift Pump

THE Air Lift system installed in Savannah, Ga., between three and four years ago, continues to justify the rather bold step then taken in selecting that appliance in connection with an addition to the city's water supply. The duplication of the original plant, within a year of its carrying into operation, has provided the city with a large and satisfactory supply from a number of 12-inch wells, which have yielded as much as 11 million gallons per day, the whole of which was handled by the plant. The accompanying illustration shows one of the Rand air compressors, which have cross-compound condensing Corliss steam cylinders, respectively eighteen and twenty-eight inches in diameter, with thirty-six inches stroke. The duplex air-cylinders are each twenty inches diameter. The freedom from repairs and the continuity of the work done are among the features which have commended the system to those in charge of the plant.



Courtesy of Ingersoll-Rand Co., New York.

SAVANNAH WATER-WORKS

THE WATER-WORKS OF SHEFFIELD, ENGLAND, were purchased by the municipality in 1887, an unusual feature of the transfer being that a portion of the stock was retained by the shareholders in the former company, under an arrangement which secures them a share in the profits until the city redeems the entire holding. A gross revenue of \$405,000 in 1887 rose to \$823,000 in 1904, working expenses increasing in a somewhat less ratio, with a corresponding augmentation of the amount available for distribution. These gains have been made contemporaneously with various reductions in the charges formerly levied; among these may be mentioned the abolition, in 1904, of the charge for water supplied to public baths and similar institutions, involving a saving to the Health Department of \$13,000 a year.

FRANKFORT, IND., which erected a municipal electric lighting plant, at a cost of \$100,000, has divorced politics from its management and converted a "white elephant" into a paying concern.

LITERATURE ON MUNICIPAL TOPICS

Reviews of Some Important Books—Municipal Reports Received

Books

Engineering Contracts and Specifications. By J. B. JOHNSON, C.E., Late Dean of the College of Mechanics and Engineering, University of Wisconsin. New York: The Engineering News Publishing Co.—Third Edition, Revised, 1904. 6 x 9 ins., pp. xviii + 563. Price, \$3.00.

Prof. Johnson's work on contracts has become so well known among those in whose interests it was produced that it would seem almost idle to direct the attention of our readers to this latest edition of a book which has become almost indispensable to a large official and professional class. For it is not alone to engineers that its contents are of value; the city clerk, and even the city solicitor, will find within its covers counsel which, while it may, in some cases, merely make assurance doubly sure, is by no means to be slighted on that account. There is, in fact, no department of public duty, involving the execution of tangible work, in which the author's ripe experience has not enabled him to contribute data of service to all classes of officials. These cover every stage, from the inception of the project, through the letting of the contract to the completion of the work, and even beyond that point to the settlement of the difficulties only then arising, when "extras" come to be dealt with. Representative examples of specifications, covering almost every class of undertaking, are among the most valuable of the contents; while the author's elucidations and comments add largely to the assurance with which these precedents can be adopted for other work.

Prof. Johnson takes strong ground in the matter of the engineer's position in acting as the final arbiter between client and contractor. After stating that the engineer, usually employed by the client, is charged with the duty of administering and enforcing the contract, he proceeds as follows: "It is well understood also that the engineer is supposed to act always in a strictly professional and administrative capacity, that he has no personal interest in favor of, or against either party, and that his sole object is to see that the contract is faithfully carried out in accordance with its express terms and real meaning. It is also recognized that he is the most competent person to determine all differences and disputes, where these arise between the parties to the contract, or between two or more contractors engaged upon the same work. It is proper and right, therefore, that he should be made the referee in all cases of dispute or misunderstanding, and that his position as arbitrator should be made final and conclusive in the premises. If it be expressly agreed upon between the parties themselves that the engineer shall act in this capacity, then his decision does become binding and final upon the parties, even to the exclusion of the action of the courts, unless it can be shown that the engineer acted through prejudice, or ignorance, or

fraud." The realizing sense of the engineer's responsibility, here conveyed, was no doubt a chief factor in the advice given, on another page, in regard to the framing of the "general clauses" of a specification, special reference being made to the necessity of their insertion even when they may appear to be unnecessarily voluminous. "The engineer should be careful, however, that all such clauses are consistent as between themselves, and it is best also to make them mutually exclusive. In other words, the same thing should not be described or defined in more than one clause, as repetitions only weaken the document. Furthermore, *no condition or limitation should be inserted without a full intention of strict compliance.* If the engineer begins to relax in his requirements in one particular, the contractor will not be slow to take advantage of such precedents, and to claim similar privileges in other directions. If the engineer could know in advance who the contractor was to be, many of the clauses here offered might be dispensed with, in case the contractor was known to be thoroughly honest and competent. The specifications are prepared in advance, however, and it is wise to assume that the contractor will be a more or less irresponsible party, without reputation to sustain, and whose sole object is personal gain."

These extracts are given here because they indicate, better than pages of attempted description, the scope and character of a work which will grow in value to the purchaser the more he becomes acquainted, by diligent reference, with the precedents brought together by the author. These would be valuable even if they stood alone, but, combined as they are with the criticism and advice of an exceptionally qualified commentator, it would be difficult to say too much in praise of the book, or to go too far in urging its claims to a place in every library making any pretensions to completeness.

Small Destructors for Institutional and Trade Waste. By FRANCIS GOODRICH.—London: Archibald Constable & Co., Ltd., Demy 8vo., 127 pp., 28 illustrations.—Price 4sh.

This work is devoted to a description of small furnaces for waste disposal, on the premises, of separate buildings and business establishments. The author presents some strong arguments for the installation of these furnaces, and opposes the prevailing practice of burning institutional wastes under steam boilers. He gives descriptions and cuts of several English makes of small destructors, claiming for them great strength and durability and low cost of maintenance and operation, but the necessity for using forced draft, derived from other sources than the destructor itself, would seem to somewhat limit their usefulness. In one or two cases referred to the heat is utilized by an adjoining disinfecting chamber. Portable or traveling destructors are described at some length and il-

illustrated by several cuts. These are equipped with steam boiler and all apparatus for rapid work. A portable furnace of five tons daily capacity, fifteen feet long, seven and a-half feet wide and eight and a-half feet high, weighs seven tons and can be moved by three horses, the steam generated not being sufficient for its own motive power. Some eminent authorities are cited in support of these furnaces for use at military camps and at points where a large number of persons are temporarily gathered. It is claimed that there is a future for this form of furnace, though there are no reports of any in actual service.

A chapter of the book is devoted to American practice, with descriptions and illustrations of one form of American destructor largely used by institutions and business establishments. The author credits this country with far greater progress in this particular direction than in the construction of larger plants for municipal works, and is undoubtedly correct in this conclusion. Something like eighty small furnaces are now in use, of which the U. S. Government has twenty at the various army posts, naval stations, hospitals and sanatoria. The majority are at public institutions and hospitals and hotels. Several large department stores destroy all worthless matter, and in three or four cases the heat is utilized by steam boilers or feed-water heaters. The number of installations and their continuously successful use are far in advance of British practice, as reported by the author, and the beneficial and economical results from their use indicate the possibilities of a still wider field.

Under the head of disposal of trade refuse there are tables of the value of low grades of colliery screenings, wood refuse, etc., with analyses of various woods, peat and straw, together with their approximate calorific value as compared with coal.

In the closing chapters treating of the disposal of animal waste by cremation and digestion, the author ignores American "reduction" practice, although this system is an important factor in municipal waste disposal, besides being employed by a number of private companies.

The two previous volumes of Mr. Goodrich, *The Disposal of Towns' Refuse*, and *Power Production from Waste*, are standard works indispensable to any one investigating this question. The present book deals with a minor phase of this subject and describes apparatus found to be efficient in a more limited field of usefulness. Inasmuch as this particular line of waste disposal in separated buildings has already been carried, in this country, to a point far beyond that attained by our British cousins, and seeing that the installation of smaller American destructors has become a part of the recognized and necessary equipment of institutions, hotels and business houses, it is a question yet to be determined how far one can profit by the experience and examples cited and described in the present volume. But Mr. Goodrich has done excellent work in collecting, condensing and arranging the matter and illustrations, and produced an authoritative work for conditions in which British types of destructors are accepted as the standards for waste disposal.

Thirty-sixth Annual Report of the State Board of Health of Massachusetts.—Boston, 1905. 6 x 9 ins., xxxvi. + 448 pages.

Covering the year ended September 30, 1904, the present volume is noteworthy for the greater condensation shown in comparison with previous reports—a feature which will be welcomed with the reservation that no considerations of space should be allowed to mar the comprehensiveness of public documents which have become classics in the literature of sanitary legislation and administration. It does not often fall to the lot of a public body to chronicle, in one volume of its proceedings, the death of two men, distinguished in a particular walk of life, who have been for years the colleagues and friends of those constituting the Board. Dr. Samuel Warren Abbott, who was Secretary to the Board from its formation, in 1886, and Health Officer under its predecessor, truly gave the best years of his life to a service in which all his interests and delights were centered, while in Dr. Thomas Drown, at the time of his death President of Lehigh University, a much wider circle than the entire State of Massachusetts loses an authority whom it will be difficult to replace, even in days when it has become fashionable to regard no one as indispensable. Dr. Charles Harrington, of Boston, was chosen to succeed Dr. Abbott as Secretary, no appointment being made in succession to Dr. Drown as Consulting Chemist.

The Lawrence experiments on sewage purification and water filtration occupy a large share of space in the present volume and furnish, as in the past, valuable data for public bodies and their technical advisers. Limits of space forbid more than this reference to researches which increase in value as results accumulate and which afford, already, ample ground for the action of the Board in many matters coming before it for determination. Thus, the Board was able, during the year under review, to dismiss as inadequate and unsuitable two proposals for dealing with the water supply of Lawrence—near which city the experiments are carried on—thereby preventing what, in the light of experience, must be regarded as a wasteful expenditure of public funds. An extract from the report, dealing with the present unsatisfactory condition of this city's filtration plant, will be found on another page of this issue.

The work of the Board is not confined to the larger affairs generally coming under the notice of our readers but extends to minor features of public hygiene. A valuable work is being carried on in detecting and preventing the sale of adulterated food and drugs—a work to which public attention has been effectively directed, during the past year or more, by successful prosecutions of offenders in certain glaring cases. Among the more striking examples of fraudulent pretence enumerated in the report we may cite that in which "N'egg," a peculiar product which came under the Board's notice many years ago, was again placed upon the market. It was claimed to be "the only genuine and nutritious substitute for eggs" and was put up in two boxes, one containing a white and the other a yellow powder, purporting to be "equivalent in

value to the whites and yolks of one dozen eggs." The report states that "as in the old days, the composition of the egg 'white' was found to be nothing but tapioca starch; while that of the egg 'yolk' was also tapioca starch, colored with a coal tar dye." A remedy claiming to "do away with both the necessity and desire for beer, wine and whiskey" was found to contain 29.51 per cent. of alcohol by volume and to be entirely free from the starch-converting enzymes characteristic of the substance giving its trade name to the compound.

Issued nominally as a report for the benefit of a particular State, the present volume possesses in a marked degree that quality of universality which has made its predecessors indispensable to a large class, not merely in America but in lands which gave the initial impulse to hygienic investigation and practice. In placing these monumental records at the disposal of specialists in every part of the world, Massachusetts meets, with generous hand, the obligations under which she, in common with others, has been placed by earlier investigators, who paved the way amid difficulties and discouragements happily unknown in our more enlightened age.

Earthwork and its Cost. By Halbert Powers Gillette, M. Amer. Soc. C. E.—New York: The Engineering News Publishing Co., 1904. Bound in Linen, 5 x 7½ ins., 24 pages; with figures and illustrations in the text. Price, \$2.00.

In no department of constructional work is the engineer or the contractor brought face to face with such a perplexing variety of conditions, vitally affecting values, as in that of earthwork. It is not surprising that Pocket Books and other works of reference should, with scarcely an exception, devote a large proportion of space to the discussion and attempted elucidation of the many points arising in this field, and it is a mere truism that many of them have assisted to prevent disappointment to clients, mortification to engineers and loss to contractors. The work before us, however, deals with this subject alone, and justifies that course by the array of figures and comments which the Author's extensive experience in this branch of work has enabled him not merely to collect but to marshal so as to be readily intelligible to the seeker after facts. While no class of earthwork appears to have been overlooked, it is not so much in that circumstance as in the painstaking elaboration of each branch of his investigation that the value of his work lies. No other result than a comprehensive and informative volume could be expected from the writer of the "fifteen causes of underestimates" set forth on pages 4 and 5, among these being factors beyond the would-be estimator's control—such as a dearth of published cost data—and others to which this extenuation does not apply. The book itself will go far to remove the former element and it can scarcely fail, if merely by suggestion, to warn those concerned from a continued indulgence in the happy-go-lucky practices with which engineers become only too familiar as their experience in letting contracts increases.

One criticism might suggest itself in the failure of the

Author to make due allowance for the conditions under which the work of his predecessors was performed; this applies more particularly to one notable writer, to whom American and foreign engineers will always be deeply indebted in this and other fields of engineering work.

New York.—Published by The Otis Elevator Company.—This handsome volume, issued as an effective display of the products of a well-known manufacturing firm, is so far removed from the category of trade publications, as that term is generally understood, that surprise and admiration are mingled in turning over its leaves. Four hundred illustrations of a city which is now approaching its tercentenary give the outsider a better idea of the American commercial metropolis than any similar collection we can call to mind. While the views are largely made up of buildings in which the firm's elevators are in use, thus enforcing the magnitude of its operations, they cover so much of the linked boroughs as to leave no part of the vast panorama unrepresented. In addition to single views, there are several groups and perspectives, the gem of the whole forming the back cover, showing "the canon of New York," that is to say, Broadway as seen looking north from Bowling Green. It is truly claimed that, but for the introduction of elevators on a scale scarcely dreamed of twenty years ago, such a vista would be an impossibility to-day.

Public Documents Received

Twenty-eighth Annual Report of the New Jersey State Board of Health.—Trenton, N. J., 1905.

Municipal Reports: City of St. Joseph, Mo., for the Year 1904-5.

Twenty-third Report of the State Geologist: New York State Museum, 1903.—Albany, N. Y., 1904.

Annual Report of the Board of Public Service, Water Works Division, Cleveland, Ohio, for 1904.

Hydrology of the State of New York: New York State Museum, Albany, 1905.

Annual Report of the Cincinnati Park Department for 1904. Cincinnati, 1905.

A Report, by Charles Mulford Robinson, upon the Street Development of Colorado Springs, Colo.—Dated July 29, 1905.

A Report upon the Underground Wiring System of Hartford, Conn., by Frederick L. Ford, City Engineer.—Dated October 25, 1905.

Articles in American Publications

The Journal of the Franklin Institute (Philadelphia, December) will interest municipal and other engineers by the paper on "Thermit Practice in America," contributed to the Institute's Proceedings by E. Stütz. Rail welding and other applications of this art are fully described. The use of concrete piles is the subject of an illustrated report of a committee, recommending the award of a Premium and Medal to Frank Shuman, the inventor of the "Simplex" system.

Moody's Magazine, a new venture started by the Moody Corporation, 35 Nassau street, New York City, is a 25-cent monthly review for "investors, bankers and men of affairs," which should fill a gap between the conventional magazine and the purely financial publications. The opening number (December) is largely devoted to a symposium on the prospective effects on prices, wages, interest, securities, etc., of the increased supply of gold. Well written articles on "Canada and the Preferential Tariff" and "Common Mistakes in Accounting" may serve to indicate the field which the magazine is designed to fill.

Everybody's Magazine (New York, January) continues Charles Edward Russell's "Soldiers of the Common Good," in which "the bloodless revolution overturning Great Britain and Europe is treated by a master hand. Mr. Russell depicts the results of municipal ownership in English life and shows what is being done, under municipal auspices, for the amelioration of social conditions in the lower classes. A study of these articles, tempered with more or less discrimination, is essential to any up-to-date knowledge of the problem with which they are concerned. An "Editor's Note" refers to the proof afforded, by the articles, of "the pitiful inadequacy of municipal ownership to uplift the miserable poverty of the London slums—to overcome the cruel traditions of British caste."

The Cement Age (New York, December) devotes nine pages to an instructive discussion of "Concrete in Municipal Work," as exemplified by the growing reliance upon this material by Mr. George S. Webster, Chief Engineer of the Philadelphia Bureau of Surveys, and his Assistant Engineer Mr. Henry H. Quimby. Sewers, bridges, bulkhead walls and other structures are illustrated in the article. "British Standard Specifications for Cement," a paper read before the American Society for Testing Materials, by Robert W. Lesley, Vice-president, embodies much useful information on a subject which has not always had the advantage of lucid exposition. Incidentally, Mr. Lesley is able to congratulate England, "a country which we are rather prone to consider slow, whose methods are sometimes stated to be behind the times and whose ways of accomplishing things are held up for some of us to ridicule," upon the preparation of these standard specifications in little over a year.

Articles in Foreign Publications

The Canadian Municipal Engineer (Montreal, November) contains, in French and English, the annual report of the Union of Canadian Municipalities and the official report of the Winnipeg Convention, superseding a pamphlet previously in circulation.

The Sanitary Record (London, November 30; 3 pence) contains the concluding portion of an article by Dr. Christopher Childs, in which three notable outbreaks of typhoid fever, at Lincoln, Maidstone and Worthing respectively, are studied and compared.—A paper by Mr.

Thomas Lloyd, Cleansing Superintendent at Preston, England, gives a valuable account of the system of garbage disposal in that large manufacturing city.

Public Works: October-December, 1905.—Published for The Civil Engineering Press by the St. Bride's Press, Ltd., 24 Bride Lane, London, E. C. Price, One Shilling. Annual subscription, including postage, Five Shillings.—Originated as a high-class shilling (25c.) monthly in July, 1903, and subsequently changed to a half-crown (60c.) quarterly, this magazine is now running as a shilling quarterly under changed ownership. In its present guise, with shorter articles and paragraphs on current topics, it should command a wider interest and attain a more enduring position than was possible under the artificial restrictions imposed by the too ambitious form first adopted. Among the articles in the present issue, of special interest to municipal engineers, are those on electrically-driven pumps for small water supplies and on ferro-concrete pipes.

The Surveyor (London, December 1; 3 pence) contains the first installment of a paper by Mr. John B. C. Kershaw, on "Electrolithic Methods of Sewage Sterilization" and an important symposium on water filtration, the latter made up of three papers read and discussed at the Hastings meeting of the Royal Sanitary Institute on November 25. The fourth of a series of articles on "Attrition Tests of Road Stones," by Mr. E. J. Lovegrove, M. Inst., C.E., while of especial interest to British officials, should be mentioned as affording valuable data as to the methods of investigation pursued, the microphotographs being excellently reproduced. The seventh and concluding article on "Crematoria in Great Britain and Abroad," by Mr. Albert C. Freeman, is announced for the issue of December 8; we shall be surprised if the entire series is not reproduced as a volume; its value fully entitles it to that more convenient and enduring form.

THE OBJECTIONS TO TELEPHONE MOUTHPIECES have led the British General Electric Company to devise an instrument in which all danger is avoided by simply abolishing that attachment. The receiving and transmitting apparatus is combined in a small metal case, shaped like a watch, which is held continuously to the ear both in speaking and in listening, the transmitting microphone being made so sensitive that it becomes unnecessary to concentrate the sound waves on it by the aid of any mouthpiece such as is ordinarily used. Mounted on a handle, with a speaking key, the new arrangement is exactly similar to the common combined receiver and transmitter, except that there is no mouthpiece, and the speaker, as it were, addresses himself to the world at large, instead of talking into a trumpet-shaped orifice.

TRENTON, N. J., has entered upon a crusade against property owners who do not connect with the sewers.

CONCRETE SIDEWALKS

OUR contemporary, *Concrete*, published in its issue of November 15 some notes on the comparative cost of cement sidewalks from which it appears that prices in the city of Duluth range from 15 to 17½ cents per square foot. The city authorities find, however, that similar work is being done at lower prices elsewhere, Pontiac, Mich., being able to obtain walks for eight cents and cross-walks for twelve. The following specification is used in the latter city:

"In clay the excavations are required to be ten inches below the top of finished walk, and a sub-foundation of sand or cinders, six-inch thick, well tamped. If drainage is needed property owner furnishes tile, and contractor puts same in. A concrete base of three inches is required, consisting of one part cement and three of clean, sharp sand, dry-mixed first.

"The wearing surface consists of two parts of sharp sand and one part cement, same to be one-inch thick. The cement shall be Portland, of the best quality, and must be approved by the City Engineer and Sidewalk Committee. The grade is established by the City Engineer. All obstructions and surplus dirt must be removed by the contractor at his expense. The contractor has a right to charge for all filling, but does the excavation work up to a depth of twelve inches. He also must furnish a bond of \$500, and guarantee the walk for five years."

Eight cents per square foot is also paid in Minneapolis and St. Paul, while Stillwater, Minn., states that nine cents is there paid under the following specification:

"When the sub-soil is of clay or other unsuitable material, it shall be excavated to the depth of ten inches below the surface of the sidewalk to be laid, and back-filled with sand or gravel to within three inches of the surface or grade of the sidewalks, and parallel thereto; and well-rammed or tamped. Upon this foundation a bed of two and one-half inches deep is to be laid, composed of one part Portland cement, two parts sand, and three parts gravel or crushed stone, the largest piece being not more than one inch in diameter; or, in lieu of the above, one part of

Portland cement and four parts of sand are to be used. The cement and sand are to be thoroughly mixed while dry, then to be wet and made into a suitable mortar or concrete, and at once placed and tamped or rammed to a uniform surface, parallel to the surface of the sidewalk when finished."

We are indebted to Mr. Frank J. Schnauber, City Engineer of Syracuse, N. Y., for a copy of the specification in use in that city, from which we extract the following:

"Total depth 8 inches, consisting of 4 inches of sand and gravel or mill cinders, 3 inches of Portland cement concrete base and 1 inch of Portland cement top or surface.

"After the sub-grade has been properly prepared, a bed of sand and gravel or mill cinders shall be placed which, after being wet and thoroughly compressed, shall be 4 inches in thickness. Upon this bed shall be placed Portland cement concrete 3 inches in thickness, made as follows:—The parts by measurement shall be one part cement, three parts sand and five parts fine crushed stone or screened gravel. Portland cement shall be of the best quality, freshly burned and finely ground, and shall stand the tests required by the City Engineer.

"The sand shall be clean and sharp, free from loam or clay. The stone (if stone be used) shall be so crushed that the largest pieces shall not be greater than 1 inch, nor the smallest less than ¼ inch in diameter. It shall be free from dust or dirt. The screened gravel (if gravel be used) shall correspond in size to those specified for crushed stone and shall contain no dust or dirt. The cement and sand shall be mixed together dry and made into a mortar without excessive use of water. The stone or gravel, thoroughly wet, but containing no loose water, shall be applied to the mortar and thoroughly mixed therewith. The concrete thus prepared shall be immediately placed in position and thoroughly rammed. The top shall be composed of clean, sharp sand and Portland cement, in equal parts, wet and pounded in place.

"The surface shall be floated with a straight edge smooth and even, subsequently floated with a short wooden float and completed with a plastering trowel. The sidewalk shall be laid in blocks not greater than 5 feet by 5 feet."

A NEW SYSTEM OF FILTRATION

SPRINGFIELD, MASS., is one of many cities which suffer from objectionable tastes and odors in their water supply during what has come to be known as the anabœna season, the organism of that name being responsible for the condition in question. Mr. Allen Hazen, of New York, well known as a specialist in water purification, having been consulted by the city authorities has reported in favor of a scheme by which that portion of the city's supply which is derived from the Ludlow source will be passed through open beds of sand to be formed on a flat area near the upper reservoir dam. It is proposed to enlarge this area "by excavating on the sides and filling out into the shallow parts of the reservoir adjoining."

This procedure is, of course, very much on a par with ordinary sand filtration, but, as Mr. Hazen points out, the water is incapable, during the anabœna season, "of being purified by ordinary continuous filtration, because the putrescible matter contained in the water requires far

more air for its oxidation and destruction than is capable of entering filters of standard construction." He adopts, therefore, the intermittent principle which has long been successfully applied to the treatment of sewage on limited areas, thereby creating a new precedent in water filtration. Under this method, the work of filtration will not be continuous through any one bed, but each bed will be laid off, at such intervals and for such periods as may be found necessary, to allow of its aeration before being again called upon to act. The beds, not being required to work except during the summer, need not be covered, as would otherwise be necessary, and the arrangements generally will be of a somewhat temporary character, designed to meet the urgent needs of next summer. On this account, the necessary grading is already under way and the construction of the earthwork filter-beds will follow in the spring. A total expenditure of \$75,000 is contemplated by the order adopted by the City Council.

WATER—OLD AND NEW VIEWS

In a paper on "Public Water Supplies," by Mr. John B. Hawley, published in the Proceedings of the Engineering Association of the South (Vol. XVI., Part 3) the author refers to the "Kentucky skepticism" in regard to water which existed in the sixteenth century. The following extract from *The Hospital* was used to illustrate this early belief in a modern definition of the fluid—a clear liquid, formerly used as a beverage: "It needed a very bold man to resist the medical testimony of three centuries ago against water drinking. Few writers can be found to say a good word for it. One or two only are concerned to maintain that 'when begun in early life, it may be pretty freely drunk with impunity'; and they quote the curious instance given by Sir Thomas Elyot, in his *Castle of Health* (1541), of the Cornishmen: 'Many of the poorest sort, who never, or very seldom, drink any other drink, be, notwithstanding, strong of body and like, and live well until they be of great age.' Thomas Cogan, the medical school-master of Manchester fame, confessed, in his *Haven of Health* (1589), designed for the use of students, that he knew some who drank cold water at night or morning without hurt; and Dr. James Hart, writing about fifty years later, could even claim among his acquaintances 'some honorable and worshipful ladies who drink little other drink, and yet enjoy more perfect health than most of them who drink of the strongest.' Sir Thomas Elyot himself is very certain, in spite of the Cornishmen, that there be in water causes of divers diseases, as of swelling of the spleen and liver. He complains oddly also that 'it flitteth and swimmeth,' and concludes that 'to young men and them that be of hot complexion it does less harm, and sometimes it profiteth; but to them that are feeble, old, and melancholy it is not convenient.' But the most formal indictment against water is that of Venner, who, writing in 1622, ponderously pronounces to dwellers in cold coun-

tries: 'It doth very greatly deject their appetites, destroy the natural heat, and overthrow the strength of the stomach, and, consequently, confounding the concoction, is the cause of crudities, fluctuations, and windiness in the body.'

Turning to the more modern aspects of water supply, the author discusses "the two great obstacles in the way of successfully operating municipally owned water-works plants—politics and waste water." The following extract deals with the latter point: "It costs just so many dollars to pump so many gallons of water against a certain head; and if by carelessness or worse half of those gallons are wasted, half of your coal has been needlessly and wastefully burned. Water, like any other commodity, should be sold by measure. Your grocer will not sell you his goods at a 'flat rate' by the year, but at so much per gallon, pound or package; your butcher is equally particular, and probably 'mine host of the white apron' would not agree to irrigate you at a fixed price per month. For many years water meters have been recognized as a safe and accurate means of measuring water. They are sufficiently accurate for all practical purposes, and never indicate more water than passes through them, an occasional complaint to the contrary notwithstanding. When Fort Worth had 2,500 consumers, or that number of taps into the mains, 3,000,000 gallons were pumped every twenty-four hours, and the yearly receipts were \$50,000, with no meters. To-day there are nearly 6,000 taps; pumpage, 2,500,000; yearly receipts, \$85,000. A population of 2,500 used and wasted more water, without meters, than 45,000 population getting its water through meters. Those silent watchmen have done the work. Ninety per cent. of the people opposed the installation of meters. Now ninety-nine per cent. would oppose a return to the old-fashioned flat rate."

HYGIENE OF BARBER SHOPS

We think that many of the provisions cited by the following report from U. S. Consul-General Guenther, of Frankfort-on-the-Maine, can be found in the Massachusetts statutes:

"In late years the hygienic requirements with reference to barber shops have been greatly increased and it seems that they are constantly becoming more severe. So far the authorities had restricted the regulations to the utensils, but lately the personal cleanliness of the barber has also been made the subject of municipal legislation in Germany. Recently the following rules have been established by the municipal government of a larger German city:

"The cut-off hair must at once be removed; the floor of the shop must be washed at least twice per week; cold and hot running water must be supplied, and the barber must wash his hands with warm water before attending to a customer. No cretonne or carpets are permitted in barber shops. The head rests must be covered for each

customer with a fresh napkin of paper or line. The employees must wear clean, long upper garments of light color, without pockets. The soap used must be in form of powder or small tablets.

"The lather from razors must be removed by means of paper. Instead of sponges pieces of woolen cloth or napkins have to be used. Alum or magnesia can only be used, kept in a powder box. The bowls and shaving brushes must be cleaned each time after having been used. Nobody is allowed to be shaved suffering from a visible skin disease, unless the proprietor of the barber shop is convinced that it is not contagious. Sponges, powder puffs, magnesia and styptics in lumps, and revolving brushes are prohibited. Scissors, brushes, and combs, as well as the hair-cutting machines and razors must be cleaned with ammonia or soda and an antiseptic solution. As antiseptics cylline, izal, and chinisol are recommended."

A WELL PAVED CITY

FEW cities in the South have developed more rapidly than Asheville, N. C., and fewer still have more completely taken advantage of their natural capabilities for improvement. A few years ago, when Asheville first attracted attention as a health resort, the guests who visited the city soon over-ran the modest accommodations afforded them by private homes. The enterprising Asheville-llians lost no time in providing for all who might seek their hospitality, and hotels quickly arose on all sides.

The city officials became alive to the importance of better streets and many of the dirt roads gave way to brick pavements, but the noise and slipperiness of these improvements were objected to by householders and horse owners, and particularly by livery men, horseback riding being one of the principal sources of diversion of the people who visit Asheville. The slipperiness frequently complained of in asphalt precluded its use as a substitute for brick and it was not until the merits of the Bitulithic pavement were brought to the attention of the officials of Asheville that a solution of their paving difficulties appeared to be in sight.

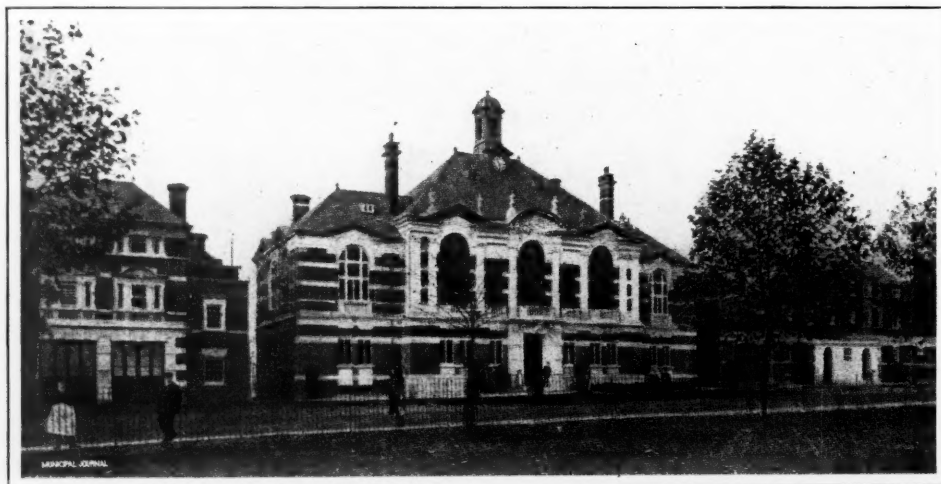
The officials of Asheville combine conservatism with progressiveness, and while the reports concerning Bitulithic were very satisfactory they preferred to make a personal investigation of the pavement before adopting it for the streets of their thriving city. The investigation was most thorough, consisting of a careful study of the Bitulithic theory from the laboratory, where the bitumens and materials were tested, through all stages of the progress of the work until the pavement was completed and thrown open to traffic. Everything appeared to be in keeping with the first reports received and every statement of the manufacturers was verified. Not content with this, however, correspondence was opened with officials in every city in which Bitulithic was laid and it was not until

convincing personal testimonials were received that a contract was placed, in the fall of 1903, for 15,000 square yards.

The work had not been completed before the most severe winter ever recorded in Asheville visited the place. The intensely cold weather continued unabated throughout the winter and the snow falls were exceptionally heavy, but when spring arrived the pavement was found to be in perfect condition and not a defect was found. The officials were extremely pleased with their first experience of Bitulithic and observant property owners demanded it for their streets to the exclusion of all others.

The conservative officials, however, demanded further tests of the new pavement, and it was not until a year's satisfactory trial, in which the Bitulithic met all the requirements of the ideal pavement, that a second contract, for 25,000 square yards, was awarded to the Warren Brothers Company. The winter of 1904 nearly equaled in severity that of the preceding one, but the two winters and an exceedingly hot summer had no effect on the pavement, which stood this severe climatic test so well that the officials were completely convinced of its superiority over others. Their confidence in Bitulithic was practically demonstrated in the summer of 1905, when a third contract, this time for 60,000 square yards, was awarded to the Warren Brothers Company, and in November, 1905, a fourth contract for 5,000 square yards was made, increasing the aggregate of Bitulithic in Asheville to 105,000 square yards.

The city council of Asheville has before it at the present time petitions for several thousand yards of Bitulithic, and the indications are that when the city is financially able to grant them it will be one of the best paved cities in the South.



Courtesy of "Municipal Journal," London.

Fire Station

Municipal Offices

Public Baths

NEW MUNICIPAL BUILDINGS, TOTTENHAM, ENGLAND